United States Air Force
611th Air Support Group/
Civil Engineering Squadron

Elmendorf AFB, Alaska

Final

Remedial Investigation and Feasiblity Study

Point Barrow Radar Installation,
Alaska

Prepared by:

ICF Technology Incorporated

19 FEBRUARY 1996

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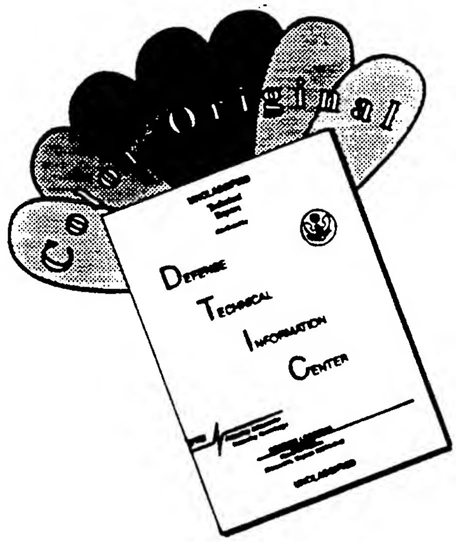

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PREFACE

This report presents the findings of Remedial Investigations and Feasiblity Studies at sites located at the Point Barrow radar installation in northern Alaska. The sites were characterized based on sampling and analyses conducted during Remedial Investigation activities performed during August and September 1993. This report was prepared by ICF Technology Incorporated.

This report was prepared between January 1995 and February 1996. Mr. Samer Karmi of the Air Force Center for Environmental Excellence was the Alaska Restoration Team Chief for this task. Dr. Jerome Madden and Mr. Richard Borsetti of the 611th CES/CEVR were Remedial Project Managers for this project.

Approved:

____

Thomas McKinney
Program Director
ICF Technology Incorporated

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NOTICE

This report has been prepared for the United States Air Force (Air Force) by ICF Technology Incorporated for the purpose of aiding in the implementation of final remedial actions under the Air Force Installation Restoration Program (IRP). As the report relates to actual or possible releases of potentially hazardous substances, its release prior to an Air Force final decision on remedial action may be in the public's interest. The limited objectives of this report and the ongoing nature of the IRP, along with the evolving knowledge of site conditions and chemical effects on the environment and health, must be considered when evaluating this report, since subsequent facts may become known which may make this report premature or inaccurate. Acceptance does not mean that the United States Air Force adopts the conclusions, recommendations or other views expressed herein, which are those of the contractor only and do not necessarily reflect the official position of the United States Air Force.

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BACKGROUND

The United States Air Force (Air Force) has prepared this Remedial Investigation/Feasibility Study (RI/FS) report as part of the Installation Restoration Program (IRP) to present results of RI/FS activities at three sites at the Point Barrow radar installation. The IRP provides for investigating, quantifying, and remediating environmental contamination from past waste management activities at Air Force installations throughout the United States. The IRP is a four-phase program that approximates the remedial investigation (RI) and corrective action program used by the U.S. Environmental Protection Agency (EPA) for addressing contaminated sites that may pose a risk to human health or the environment.

The Air Force initiated IRP activities at the Point Barrow radar installation in 1980 in response to the Department of Defense's (DOD's) commitment to identify past waste disposal sites and eliminate hazards to public health. The initial Phase I conducted by the Air Force concluded that past waste management activities at the installation may have resulted in adverse environmental impacts at one site (CH2M Hill 1981).

The Air Force's IRP Decision Document for Point Barrow of 1987 (Woodward-Clyde 1987) concluded that no further action was needed at the one Point Barrow site. However, correspondence from Alaska Department of Environmental Conservation (ADEC) personnel to Air Force personnel in November 1991 (ADEC 1991) disagreed with the no further action conclusion. The correspondence stated that further investigation was needed and that corrective action appeared necessary because of improper waste disposal practices and other issues.

A private contractor prepared the Environmental Assessment for the North Warning System (Alaska) in January 1987 (Hart Crowser 1987). The report discussed the impacts of retrofitting with long range radar equipment at the Point Barrow DEW Line facility.

In 1991, a non-Air Force investigation studied the Air Terminal Area (Shannon and Wilson 1991). This investigation was conducted by the Navy, which previously conducted operations at the Air Terminal Area.

The Air Force initiated RI/FS activities at the Point Barrow radar installation in the summer of 1993. During the initial scoping activities, which included record searches, personnel interviews, and physical inspection of the installation, the Air Force and ADEC personnel concluded that three sites warranted investigation under the IRP. This document is a detailed presentation of RI activities and provides conclusions and recommendations for addressing environmental conditions at the three Point Barrow sites. Remedial actions are recommended for one site, and further characterization is recommended for one site. No further action is recommended for the remaining site.

INSTALLATION DESCRIPTION

The Point Barrow radar installation is located at 71°17'N, 156°45'W on the north coast of Alaska, about five miles northeast of Barrow, Alaska. The 268-acre installation is situated on the Barrow Peninsula, a triangular land mass bordered on the west by the Chukchi Sea and on the east by the Beaufort Sea (Figure 1-1, page 1-5). Imikpuk Lake and the North Salt Lagoon border the installation to the west and east, respectively (Figure 1-2, page 1-7).

Point Barrow radar installation, also known as POW-M, was constructed as a main station. It consists of two module trains (A and B), rotating radar, garage, warehouse, POL tanks, air terminal building, hangar, and inactive runway. Facilities at the DEW Line installation are the most prominent feature of the area.

Temperatures at the Point Barrow installation are generally low throughout the year, with summer temperatures ranging from approximately 30°F to 55°F and winter temperatures from approximately -25°F to -5°F. Precipitation at Point Barrow averages 4.9 inches per year; snowfall is about 29 inches per year. Permafrost at the installation area is up to 1,300 feet thick. Due to the permafrost, polygonal surface patterns are abundant.

The installation is located in an area dominated by the influence of coastal and thaw lake processes, and situated at an elevation of about eight feet above mean sea level (AMSL). The hydrology of the installation is controlled by the relatively low topography and permafrost. Even with the low precipitation rates, the tundra is predominantly swampy.

Point Barrow is predominantly covered by a thin tundra mat, beneath which are deposits of recent marine clay, silt, and sand deposits of the Barrow unit of the Gubik Formation (Young 1979). The DEW Line facility was built on thaw lake deposits that consist of reworked marine units. Organic mats of peaty, silty material have been found at depth that overlie sections of marine silt and sand of the lower Barrow units of the Gubik Formation.

The vegetative habitat types at Point Barrow support a variety of wildlife. Areas in the vicinity of the installation provide habitat important to birds, mammals, and fish.

PROJECT ACTIVITIES

The Air Force conducted RI/FS field activities at three sites at the Point Barrow radar installation during 1993. The objectives of the Point Barrow RI/FS were to confirm the presence or absence of chemical contamination of the environment at the installation; define the extent and magnitude of confirmed chemical releases; gather adequate data to determine the magnitude of potential risks to human health and the environment; and gather adequate data to identify and select the appropriate remedial actions for sites where apparent risks exceed acceptable limits.

The RI field activities were carried out in a three-phased approach. The three phases, installation presurvey, reconnaissance, and RI field activities, allowed contractor personnel to confirm the

location of areas of environmental concern and identify sampling locations before conducting RI field activities. Three sites investigated during the RI activities are:

- Diesel Fuel Spill (SS01)
- Garage (SS02)
- Air Terminal Area (SS03)

The site locations are shown on Figure 1-3 (page 1-9).

The RI field activities were conducted from mid-August through early September of 1993. The RI was conducted in conjunction with RIs at seven other radar installations located throughout northern Alaska. Sixteen contractor employees were stationed in Alaska for the duration of the RI. Sampling activities at the Point Barrow radar installation included collection of surface and subsurface soil samples with hand tools, and collection of surface water, sediment, and seep samples from drainages adjacent to potentially contaminated areas.

A total of 80 samples was collected during the 1993 RI activities at Point Barrow. These included soil, sediment, and surface water samples collected from the three sites as well as samples for quality assurance/quality control (QA/QC) and to establish background levels. A summary of the samples collected is presented in Table ES-1.

Analyses of samples collected during RI activities were conducted by a fixed laboratory in Anchorage, Alaska, and a temporary laboratory set up at Barrow, Alaska. Laboratory analyses conducted by the temporary laboratory were conducted on a quick turnaround basis. Analyses conducted in Anchorage, Alaska, included primarily standard turnaround but also a few quick turnaround analyses.

The Air Force conducted a risk assessment once the data had been validated and compiled. The purpose of the risk assessment was to evaluate the human and ecological health risks that may be associated with chemicals released to the environment at the sites investigated during the RI. The risk assessment characterizes the probability that measured concentrations of hazardous chemical substances will cause adverse effects in humans or the environment in the absence of remediation. The risk assessment will be used in conjunction with state and federal standards and/or guidance to determine if remediation (site cleanup) is necessary. The Point Barrow Risk Assessment (U.S. Air Force 1996) was submitted under separate cover.

CHRONOLOGY OF ACTIVITIES

Project scoping documents were submitted between June and August 1993 for review by Air Force Center for Environmental Excellence (AFCEE) and regulatory agencies. These documents include the Work Plan, Sampling and Analysis Plan (SAP), Health and Safety Plan, and Community Relations Plan for seven DEW Line installations and Cape Lisburne. The installation Presurvey and the Reconnaissance trips were conducted in order to provide the information necessary to conduct the RI/FS activities. The Presurvey was conducted in May 1993 by a small group of contractor employees accompanied by Air Force representatives.

TABLE ES-1. SUMMARY OF REMEDIAL INVESTIGATION SAMPLING

SITE	MEDIUM	NUMBER OF ENVIRONMENTAL SAMPLES
Diesel Fuel Spill (SS01)	Soil/Sediment	20
	Surface Water	7
Garage (SS02)	Soil/Sediment	6
Air Terminal Area (SS03)	Soil/Sediment	19
	Surface Water	7
Background (BKGD)	Soil/Sediment	5
	Surface Water	2
Total Environmental Samples	Soil/Sediment	50
	Surface Water	16
QA/QC SAMPLES		
Ambient Condition Blanks	Water	1
Equipment Blanks	Water	2
Trip Blanks	Water	4
Replicates/Duplicates	Soil/Sediment	5
	Surface Water	2
Total Samples	Soil/Sediment	55
	Surface Water	25

The Reconnaissance trip was completed in June 1993 by contractor employees, and AFCEE and ADEC representatives. RI field activities were conducted from mid-August through early September 1993. Sampling was conducted from the areas of least contamination to areas of increasing contamination. The sequence of sampling from least to most contaminated was based on previous sampling data, field screening, and visual observations. Field screening was used to assist in determining the areal extent of contamination and sampling locations. Where quick turnaround sample analyses indicated information gaps about the areal extent of contamination, or exposure point concentrations for potentially exposed populations were not defined, a second round of samples was collected and analyzed.

SUMMARY OF REMEDIAL INVESTIGATION/FEASIBILITY STUDY

The following paragraphs describe RI activities conducted at the three sites that are the focus of this report and summarize the findings of the RI. Summaries of human health and ecological risks posed by chemicals detected at each site are included. The remedial alternatives are presented for the sites recommended for cleanup. The evaluation of remedial alternatives is presented in the Feasibility Study (FS), Section 6.0.

Diesel Fuel Spill (SS01). The Diesel Fuel Spill (SS01) site occupies approximately three acres located north of module train A (Figure 3-1, page 3-9). A 300-gallon spill occurred at the site in 1974; however, the exact location of the spill is unknown (CH2M Hill 1981). The site consists of two sections: a tundra area to the north adjacent to the POL storage area and a gravel pad area to the south adjacent to the west end of module train B. The POL storage area in the north portion of the site is bermed and was used as a storage area for arctic grade diesel fuels from 1956 to 1978. In the south portion of the site, a gravel road raised approximately three feet above the tundra surrounds both module trains. There is a thin layer of gravel below both module trains, and the gravel between the module trains is raised approximately one foot above the tundra. Culverts lead from below module train B north to the tundra area.

Sampling and analyses have determined that the Diesel Fuel Spill (SS01) site is contaminated with petroleum compounds [diesel range petroleum hydrocarbons (DRPH) and gasoline range petrolum hydrocarbons (GRPH)], benzene, toluene, ethylbenzene, and xylene (BTEX), and other volatile organic compounds (VOCs) commonly associated with gas and diesel fuel. The contaminated media at the site include soil, gravel pad, tundra, and surface water in the vicinity of the module train B. The source of contamination is suspected to be diesel spills and/or leaks associated with the diesel day tank at the west end of module train B. However, analytical data indicate that limited onsite contaminant migration has occurred in the active layer and surface water, and contaminants do not appear to be migrating offsite.

The risk assessment concluded that risks posed to human health and ecological receptors by site contaminants are minimal given current or future site uses. The risks and hazards are based on a conservative future scenario and are not of a magnitude that normally requires remedial action.

Based on RI sampling and analyses, risk assessment, and current and future site uses, remedial actions are not warranted at the site. Chemicals detected at the site did not pose significant

human health or ecological risks; therefore, the Diesel Fuel Spill (SS01) site is recommended for no further action.

Garage (SS02). The Garage (SS02) site is located west of module train A (Figure 4-1, page 4-9). The Garage is an approximately 90-foot by 40-foot building elevated about three feet above the tundra and is surrounded by gravel on the north, east, and south sides. The building is used for vehicle maintenance and storage. Floor drains in this building discharged directly to the tundra beneath the structure and may have received vehicle maintenance waste. The floor drains were sealed by the Air Force in July 1993 to prevent the possibility of future release of contaminants.

Sampling and analyses have determined that the Garage (SS02) site is contaminated with petroleum hydrocarbons [DRPH, GRPH, and residual range petroleum hydrocarbons (RRPH)], polychlorinated biphenyls (PCBs), BTEX compounds, and other VOCs that are components of diesel fuel. The contaminated area at the site is limited to soil under and around the Garage. The area beneath the Garage has the highest contaminant concentrations, which decrease with distance from the Garage. The suspected source of contamination is wastes discharged to the building floor drains. The drains were sealed in 1993 by the Air Force to prevent further release of contaminants.

The risk assessment concluded that risks posed to human health and ecological receptors by site contaminants are minimal given current or future site uses. The potential human health risk is not of a magnitude that normally requires remedial action. The ecological risk assessment (ERA) concluded that the overall potential risks presented by site contaminants are minimal. Therefore, considering the findings of the risk assessment, remediation of the site is not necessarily warranted.

Levels of petroleum compounds (DRPH, GRPH, and RRPH) and PCBs detected in soil at the site, however, slightly exceed ADEC guidance cleanup levels, but the extent of contamination is not clearly defined. Therefore, the site is being recommended for additional sampling in order to more fully characterize the extent of petroleum hydrocarbon and PCB contamination.

Air Terminal Area (SS03). This large area is located north-northwest of the main station facilities, around the air terminal building (Figure 5-1, page 5-11). The site consists of an expanse of gravel pads and roads that effectively berm off several wet tundra areas, a hangar, an air terminal building, and several fuel storage tanks (JP-4 and diesel). Four fuel spills have been reported by a previous Navy contractor in areas just to the west of the site. The first occurred in August 1976 and consisted of an underground pipe failure that discharged an estimated 48,000 gallons of gasoline. The second and third reported spills occurred in 1978 and involved approximately 24,700 gallons of JP-5 (jet fuel) and 277,463 gallons of gasoline, respectively. A fourth spill of unknown quantity occurred in 1986 (Shannon and Wilson 1991).

Sampling and analyses have determined that the Air Terminal Area (SS03) site is contaminated with petroleum hydrocarbons (DRPH, GRPH, RRPH, BTEX, and other VOCs that are primarily associated with gasoline and diesel fuels). The affected areas at the site are the tundra and surface water primarily in the south section of the site.

The risk assessment concluded that risks posed to human health and ecological receptors by site contaminants are minimal given current or future site uses. The potential human health risks at the site are not of a magnitude that normally requires remedial action. The ERA concluded that the overall potential risks presented by site contaminants are low. Therefore, under current and future site conditions and considering the findings of the risk assessment, remediation of the site is not necessarily warranted.

Levels of DRPH and GRPH detected in tundra and surface water at the site exceed ADEC guidance cleanup levels. Therefore, the site is being recommended for remedial action. The affected area at the site is approximately 30,000 cubic yards of tundra adjacent to and between the gravel pads and roads. The remedial action alternative recommended for the site is enhanced bioremediation. A complete description and evaluation of the remedial alternatives considered for this site are presented in the FS, Section 6.0.

CONCLUSIONS

To meet the Air Force's commitment to identify, quantify, and remediate waste disposal sites at installations throughout the United States, the prime contractor completed an RI/FS at three sites at the Point Barrow radar installation. The investigation was completed in accordance with the guidelines established in the Air Force's IRP. The RI/FS involved field investigations, sampling, and analysis at three sites at the Point Barrow radar installation.

Based on the RI sampling and data analyses and quantitative risk assessment, the Air Force has concluded there is no risk associated with observed conditions and recommends no further action at one of the three sites, the Diesel Fuel Spill (S01), presented in Table ES-2. Further characterization is recommended at one site, the Garage (SS02) (Table ES-3). At the remaining site, contaminant levels exceed ADEC cleanup guidance levels. It is recommended that remedial actions be conducted at this site: the Air Terminal Area (SS03). The remedial action alternative recommended for the site is presented in Table ES-4.

TABLE ES-2. SITE RECOMMENDED FOR NO FURTHER ACTION

SITE NAME	SITE ID NUMBER
Diesel Fuel Spill	SS01

TABLE ES-3. SITE RECOMMENDED FOR FURTHER CHARACTERIZATION

SITE NAME	SITE ID NUMBER
Garage	SS02

TABLE ES-4. SITE RECOMMENDED FOR REMEDIAL ACTION

SITE NAME	SITE ID NUMBER	MEDIUM	RECOMMENDED ALTERNATIVE
Air Terminal Area	SS03	Tundra	Enhanced bioremediation

1.0 INTRODUCTION

The Air Force has prepared this RI/FS report to present the results of RI/FS activities at three sites located at the Point Barrow radar installation. The RI field activities were conducted at the Point Barrow radar installation during the summer of 1993. The three sites at Point Barrow were investigated because they were suspected of being contaminated with hazardous substances. The RI/FS was conducted in accordance with the requirements of the Air Force IRP. RI activities were conducted using methods and procedures specified in the RI/FS Work Plan, SAP, and Health and Safety Plan (U.S. Air Force 1993a,b,c).

Section 1.0 of this report presents information concerning the objectives and implementation of the IRP, a description of the installation and the environmental setting at Point Barrow, and brief background information on the three Point Barrow sites. Project activities, including project objectives and scope, summaries of field and laboratory methods, methodologies for data evaluation and risk estimation, and a summary of background sampling, analytical results, and migration pathways are described in Section 2.0. Section 3.0 documents the RI sampling and analysis results for the one site where no further action is recommended, identifies potential migration pathways and receptors, summarizes the human health and ecological risks, and describes the conclusions and recommendations for the site. Section 4.0 documents RI sampling and analyses results for the one site where further characterization may be warranted. Section 5.0 documents the RI sampling and analysis results for the one site where remedial actions may be warranted. These sections identify all ARARs, potential migration pathways, and receptors; summarize human health and ecological risks; and describe the conclusions and recommendations, including the recommended remedial alternative, for cleanup at the one site. Section 6.0 presents the Feasibility Study (FS) of potential remedial actions for the one site that may require cleanup.

The recommended actions for each of the sites, presented in Sections 3.0 through 6.0, are preliminary. The actions for each site will be determined only after review of this RI/FS document and the Point Barrow Risk Assessment (U.S. Air Force 1996) by regulatory agencies and interested parties. When agreement is reached between the Air Force and regulatory agencies as to the appropriate action for each site, a Final Decision Document will be prepared by the Air Force that presents the rationale for selecting a particular action. The Decision Document will also formally document that selection by ensuring appropriate Air Force and state and federal agency coordination and concurrence.

Appendix A provides references and a list of acronyms used in this document. Appendix B presents photographs of the Point Barrow radar installation and sites. Appendix C is the Statement of Work describing the scope of the RI/FS activities at the Point Barrow radar installation. Sample collection logs are presented in Appendix D; sample Chain-of-Custody forms are in Appendix E. Cross-reference tables and analytical data are presented in Appendix F, and data validation reports are in Appendix G.

1.1 THE UNITED STATES AIR FORCE INSTALLATION RESTORATION PROGRAM

The Air Force IRP is the basis for assessment and response action on Air Force installations under the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). The Air Force IRP is designed to identify, confirm/quantify, and remedy problems associated with past and present management of hazardous substances and hazardous wastes at Air Force facilities. CERCLA defines a hazardous substance in Section 101; the definition includes, as examples, any substance designated pursuant to Section 311(b)(2)(A) of the Federal Water Pollution Control Act (FWPCA), any element, compound, mixture, solution, or substance designated pursuant to Section 102 of CERCLA, and hazardous wastes identified pursuant to Section 3001 of the Resource Conservation and Recovery Act (RCRA). A hazardous waste, as defined in RCRA, "may pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of or otherwise managed" (Section 1004[2][B] of RCRA).

The DOD initiated the IRP in 1976 to identify, investigate, and mitigate environmental hazardous waste contamination that may be present at DOD facilities. In June 1980, DOD issued Defense Environmental Quality Program Policy Memorandum (DEQPPM) 80-6, requiring identification of past hazardous waste disposal sites at DOD agency installations. The Air Force implemented DEQPPM 80-6 in December 1980 and revised it in 1981.

Executive Order 12316 of 14 August 1981 directed the military to design its own program to remedy uncontrolled hazardous waste disposal sites consistent with the National Contingency Plan (NCP) established by CERCLA. In response to the directive, the DOD instructed its branches to identify hazardous waste disposal sites to which they contributed wastes, and to comply with environmental regulations at the installation level when implementing cleanup. DOD subsequently developed the basic IRP after which the Air Force IRP was modeled. DEQPPM 81-5 of 11 December 1981, implemented by Air Force Headquarters in January 1982, sets forth the basic authority and objectives for the Air Force programs.

The Superfund Amendments and Reauthorization Act of 1986 (SARA) augmented the scope and requirements of CERCLA and provided specific directives to federal facilities regarding investigation of waste disposal sites. Under SARA, technologies that provide permanent removal or destruction of hazardous wastes or contaminants are preferable to actions that only contain or isolate the materials. SARA also provides for greater interaction with public and state agencies and expands the role of the EPA in the evaluation of the health risks associated with contamination. SARA requires early determination of ARARs and the consideration of potential remediation alternatives at the initiation of an RI/FS. Remedial actions taken under CERCLA must comply with ARARs, which generally consist of federal, state, and local regulations. Remedial actions at facilities regulated under CERCLA are selected based on the results of an RI/FS. The RI/FS process is described in the NCP. The RI phase includes specific steps for determining the nature and extent of environmental contamination. Subsequently, the FS is implemented to evaluate alternative remedial actions prior to selection of the most appropriate action for a specific facility.

To respond to changes in the NCP brought about by SARA, the Air Force modified its IRP in November 1986 to improve continuity in the site investigation and remedial planning process for Air Force installations. In July 1987 the President signed Executive Order 12580, delegating responsibility to secretaries of various agencies to conduct site investigations and remedial actions at federal facilities. The order defined relationships between various federal and state agencies and assigned EPA the role of facilitator in resolving conflicts.

Prior to 1988 the Air Force IRP was organized into four phases, described below:

- Phase I, Installation Assessment/Records Search, identified past waste disposal sites at Air Force installations that might pose a hazard to public health or the environment. Sites identified during Phase I could be recommended for no further action, confirmation studies (Phase II), or remedial action (Phase IV).

- Phase II, Confirmation/Quantification, was intended to define and quantify contamination present at sites identified during Phase I. Stage 1 of Phase II consisted of an initial assessment, including environmental sampling, to determine whether contamination was present. Depending on the results of Stage 1, subsequent stages of investigation could be recommended to improve the characterization of site contamination.

- Phase III, Technology-Based Development, included development of new technologies for treating contaminants identified at Air Force installations. The results of Phase II investigations were used to determine the need for Phase III activities.

- Phase IV, Remedial Action, involved development and implementation of plans to remedy contamination at sites.

In 1988, the Air Force replaced the phased approach of the IRP with an approach more closely resembling the RI/FS approach used by EPA. Under this approach, Phase II investigations and Phase IV remedial action planning are conducted in a more parallel fashion to expedite implementation of site cleanups.

1.2 INSTALLATION DESCRIPTION AND ENVIRONMENTAL SETTING

Point Barrow radar installation, also known as POW-M, has been active since 1953. The Point Barrow DEW Line installation is one of many DEW Line installations located across the arctic regions of North America and Greenland. The installations were designed to operate and maintain radar systems for the detection of aircraft that may be a threat to national security.

The Point Barrow facility was constructed as a main station. It consists of two module trains ("A" and "B"), rotating radar, garage, warehouse, POL tanks, air terminal building, runway, and facilities to provide logistics support for the rest of its sector. Train "A" consists of 24 modules. Train "B" consists of 28 modules. The main section of train "A" houses the electric equipment

work areas, radar tower, a limited number of personnel quarters, administration offices, a mechanical room with emergency boiler and fuel storage, and dining, kitchen, and recreation areas. The rotating radar is in the radome adjacent to the module train and is supported by steel columns and trusses.

Train "B" is used as a personnel support module with water storage, shower, and toilets. Adjacent to this structure and connected by a corridor is the power plant.

Aircraft facilities include a 4,993-foot-long lighted runway. The surface of the runway is a 24-inch wearing course on a non-frost acting base with no overruns. The runway is currently inactive. Air traffic uses the airport in the local community of Barrow. The community of Barrow is located approximately five miles southwest of the Point Barrow radar installation. There are no known landfills at the installation; therefore, solid wastes generated at the facility are transported to the Barrow landfill.

1.2.1 Physical Geography

The Point Barrow radar installation is located at 71°17'N, 156°45'W on the north coast of Alaska, about five miles northeast of Barrow, Alaska. The 268-acre installation is situated on the Barrow Peninsula, a triangular land mass. It is bordered on the west by the Beaufort Sea and Imikpuk Lake and on the east by North Salt Lagoon. The general location of Point Barrow radar installation is shown on Figure 1-1. An area location map is presented in Figure 1-2, and a site plan is provided as Figure 1-3.

1.2.2 Climate (Meteorological Conditions and Air Quality)

The National Weather Service operates a meteorological monitoring station at Barrow. Long term measurement records exist from 1941.

Annual average precipitation at the Barrow installation is 4.9 inches, including 29 inches of snowfall. Most precipitation falls as rain in the summer months; precipitation in the period from October through May is almost always snow. Storms are usually from the west during the summer. Relative humidity is high throughout the year, but the moisture-carrying capacity of the air at the low temperatures of the Barrow area is quite low (Hart Crowser 1987).

Winds are persistent in the area throughout the year, with only one percent of the hours recorded as calm. Average wind speeds are 11.8 miles per hour. The prevailing direction is from the east; however, during storms the winds are frequently from the west. Westerly winds are generally associated with high speeds, and wind speeds of 50 miles per hour have been known to occur at Barrow (Hart Crowser 1987).

Severe weather conditions (thunderstorms, tornadoes, etc.) are virtually unknown in the area. Heavy fog can occur on occasion and is most frequent in the summer months. Visibility is reduced to less than 0.25 miles as a result of fog on an average of 65 days per year.

1

ARCTIC OCEAN
Barrow
Point Barrow
Wainwright
Point Lonely
Cilktok Point
Point Lay
Cape Lisburne
Point Hope
CHUKCHI SEA
RUSSIA
UNITED STATES
Kivalina
Kotzebue
KOTZEBUE SOUND
Shishmaref
BERING STRAIT
Wales
SEWARD PENINSULA
Gambell
Savoonga
SAINT LAWRENCE ISLAND
Nome
NORTON SOUND
Unalakleet
Stebbins
BERING SEA
Emmonak
Alakanuk
Hooper Bay
Chevak
McGrath
Bethel
Kipnuk
Quinhagak
KUSKOKWIM BAY
Mekoryuk
Nunivak Island
Togiak
Dillingham
Naknek
King Salmon
BRISTOL BAY
Saint Paul Island
Saint Paul
PRIBILOF ISLANDS
Saint George
Saint George Island
Houston
Spenard
Anchorage
Kenai
Soldotna
Seward
Homer
Seldovia
Kodiak
PACIFIC OCEAN
Pilot Point
Port Heiden
Chignik
Perryville
Sand Point
King Cove
Cold Bay
Unimak Island
Unimak Pass
Sanak Islands
Shumagin Islands
Trinity Islands
Chirikof Island
Semidi Islands
Kennedy Entrance
Stevenson Entrance
Barren Islands
SHELIKOF STRAIT

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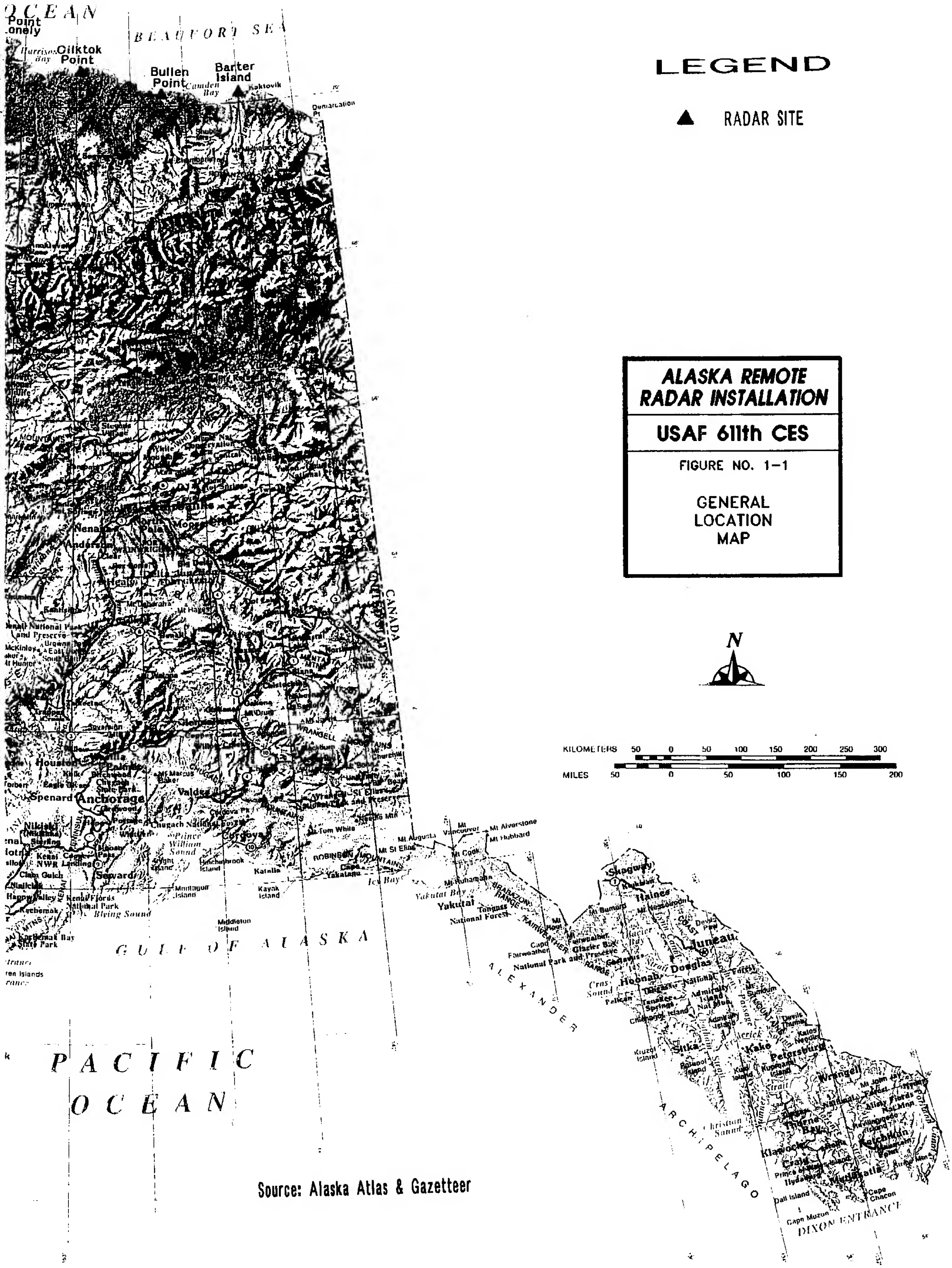


LEGEND

▲ RADAR SITE

ALASKA REMOTE RADAR INSTALLATION

USAF 611th CES

FIGURE NO. 1–1

GENERAL LOCATION MAP

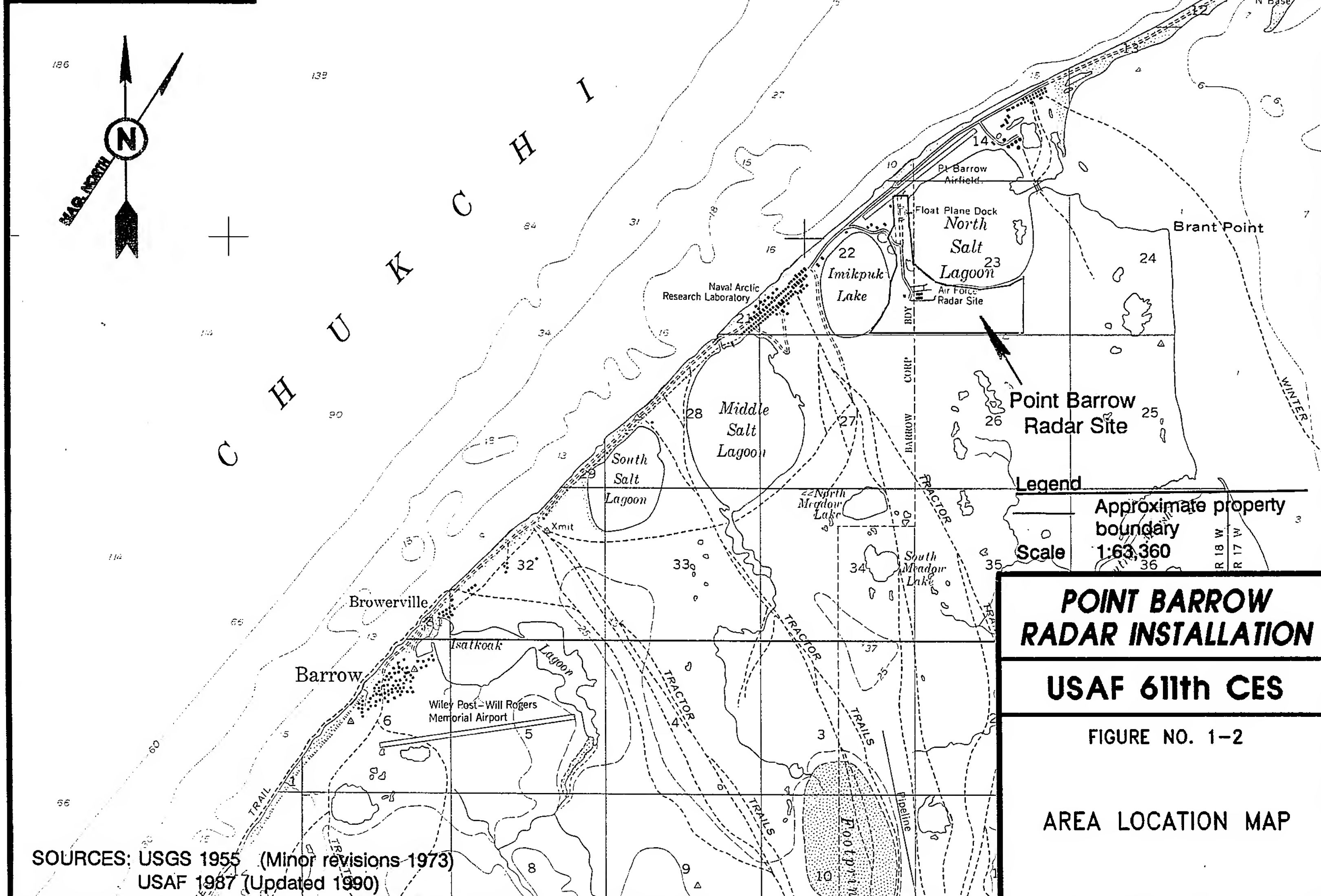
N

KILOMETERS 50 0 50 100 150 200 250 300

MILES 50 0 50 100 150 200

Source: Alaska Atlas & Gazetteer

DRAWING No. BRW-LOC



Legend

Approximate property boundary

Scale 1:63,360

SOURCES: USGS 1955 (Minor revisions 1973)
USAF 1987 (Updated 1990)

POINT BARROW RADAR INSTALLATION

USAF 611th CES

FIGURE NO. 1–2

AREA LOCATION MAP

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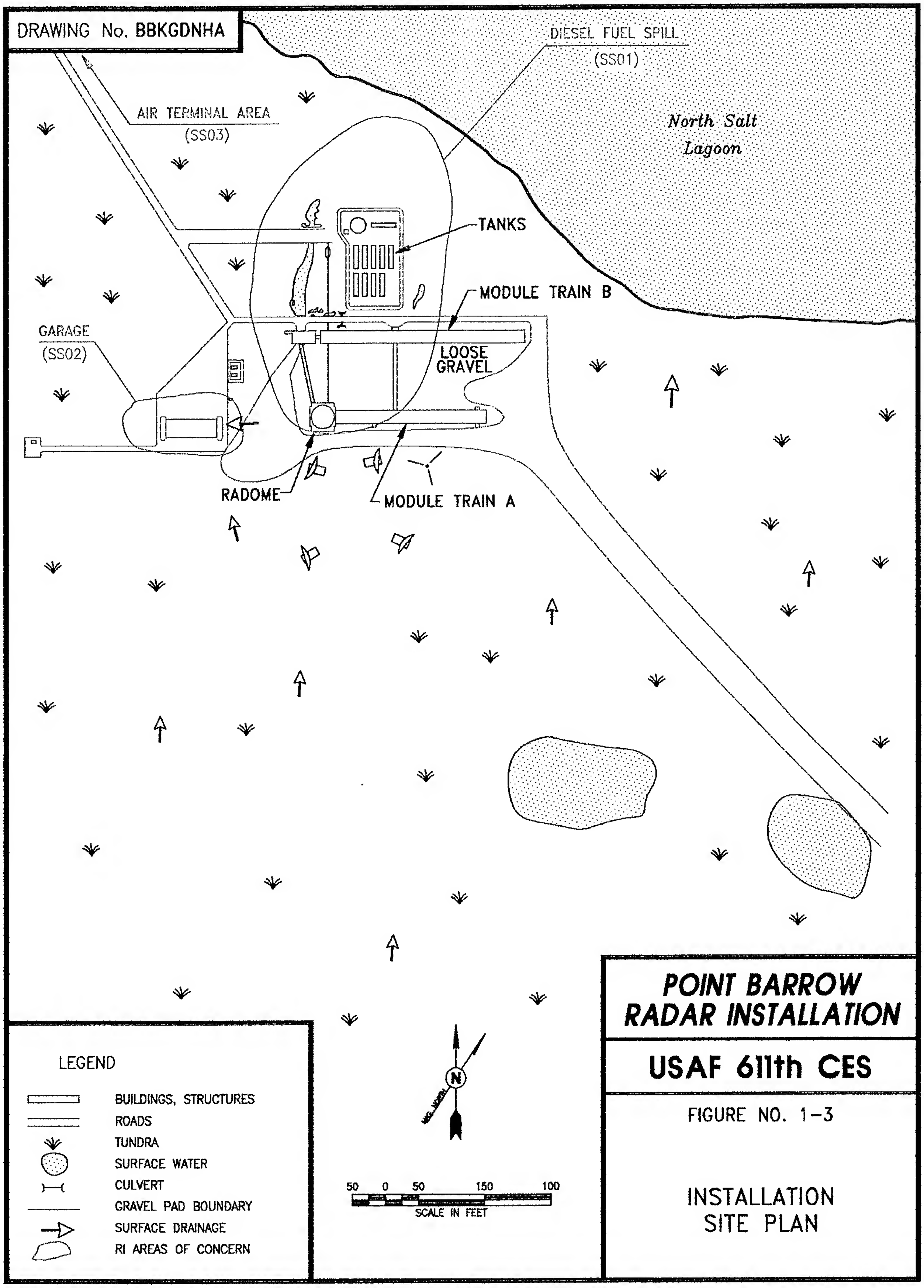
DRAWING No. BBKGDNHA
DIESEL FUEL SPILL
(SS01)
North Salt
Lagoon
AIR TERMINAL AREA
(SS03)
TANKS
MODULE TRAIN B
GARAGE
(SS02)
LOOSE
GRAVEL
RADOME
MODULE TRAIN A
LEGEND
BUILDINGS, STRUCTURES
ROADS
TUNDRA
SURFACE WATER
CULVERT
GRAVEL PAD BOUNDARY
SURFACE DRAINAGE
RI AREAS OF CONCERN
N
50 0 50 150 100
SCALE IN FEET
POINT BARROW
RADAR INSTALLATION
USAF 611th CES
FIGURE NO. 1-3
INSTALLATION
SITE PLAN

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Air quality has not been extensively measured in the Point Barrow area. EPA classified the area either as being in attainment with all air quality standards or as not being classifiable (40 CFR, Part 81) (Hart Crowser 1987). Air quality is expected to be good at the installation because there are no major sources of air pollution.

1.2.3 Geology

This section presents information on the regional and local geology of the Point Barrow area.

1.2.3.1 Regional Geology. Geologic units of all the principal time-stratigraphic systems from Precambrian to Quaternary are represented in Alaska. For the last two or three million years, frost climates have prevailed in Alaska, and the geomorphic processes have been either periglacial or glacial (Wahrhaftig 1965). Although glacial activity was extensive, it was by no means all-encompassing. Glaciation is evident in many parts of the state including the Pacific Mountain System, Arctic Mountains, Ahklun Mountains, and southern Seaward Peninsula. Some great expanses, however, received no glacial activity. The principal areas not glaciated include the Intermountain Plateaus, Arctic Foothills, and Arctic Coastal Plain. Many periglacial features such as polygonal ground, sorted circles, pingos, and ice wedges can be observed on the Arctic Coastal Plain. Figure 1-4 depicts the extent of Alaska's glacial areas.

Alaska's generally cold climatic regime has produced a condition termed permafrost, a combination of geologic, hydrologic, and meteorologic characteristics that produces permanently frozen ground. Permafrost occurs in both unconsolidated sediments and bedrock; its distribution includes most of the state, with the notable exception of the Pacific Coastal area. Permafrost is continuous on the Arctic Coastal Plain and has a significant impact on the flow of ground water and surface water. The distribution of Alaska's permafrost areas is shown on Figure 1-5. Permafrost is discussed in detail in Section 1.2.4.1.

The very strong geologic processes at work in Alaska have produced a unique environmental setting reflected in the general geology of the Arctic Region (Figure 1-6). A popular theory of the formation of the Arctic Region is that it was once an ocean basin adjacent to the Canadian Shield. Rifting of the Canadian Shield occurred during Mesozoic time and the Arctic Region drifted southwest forming the Colville Basin to the south and the Arctic Ocean to the north. At the same time, the Brooks Range orogeny began creating a source for the newly-created Colville Basin. Continued uplift of the Brooks Range produced a prograding delta that filled in the Colville Basin.

1.2.3.2 Local Geology. The Point Barrow installation is located in an area dominated by the influence of coastal and thaw lake processes. Situated at an elevation of about eight feet AMSL the installation lies between a large freshwater thaw lake (Imikpuk Lake) and a salt water lagoon (North Salt Lagoon). North Salt Lagoon has an outlet on the northeast side to the larger Elson Lagoon, which borders the Beaufort Sea.

Surficial deposits in the area consist of recent marine clay, silt, and sand deposits of the Barrow unit of the Gubik Formation (Young 1979). The DEW Line facility was built on thaw lake deposits that consist of reworked marine units. Organic mats of peaty, silty material that overlie sections

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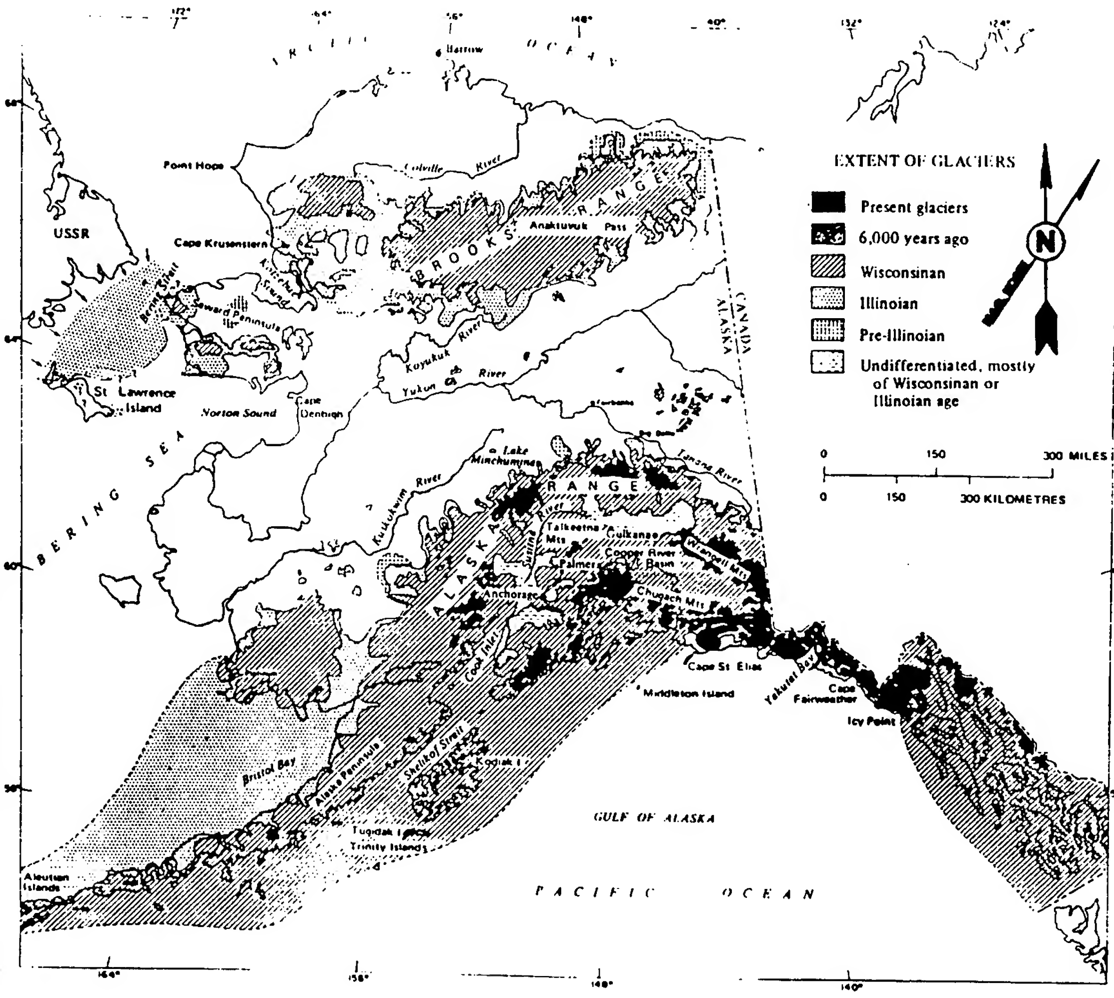
DRAWING No. LIS1-4



SOURCE: Pewe 1975

ALASKA REMOTE RADAR INSTALLATIONS

USAF 611th CES

FIGURE NO. 1-4

QUATERNARY GLACIATION IN ALASKA

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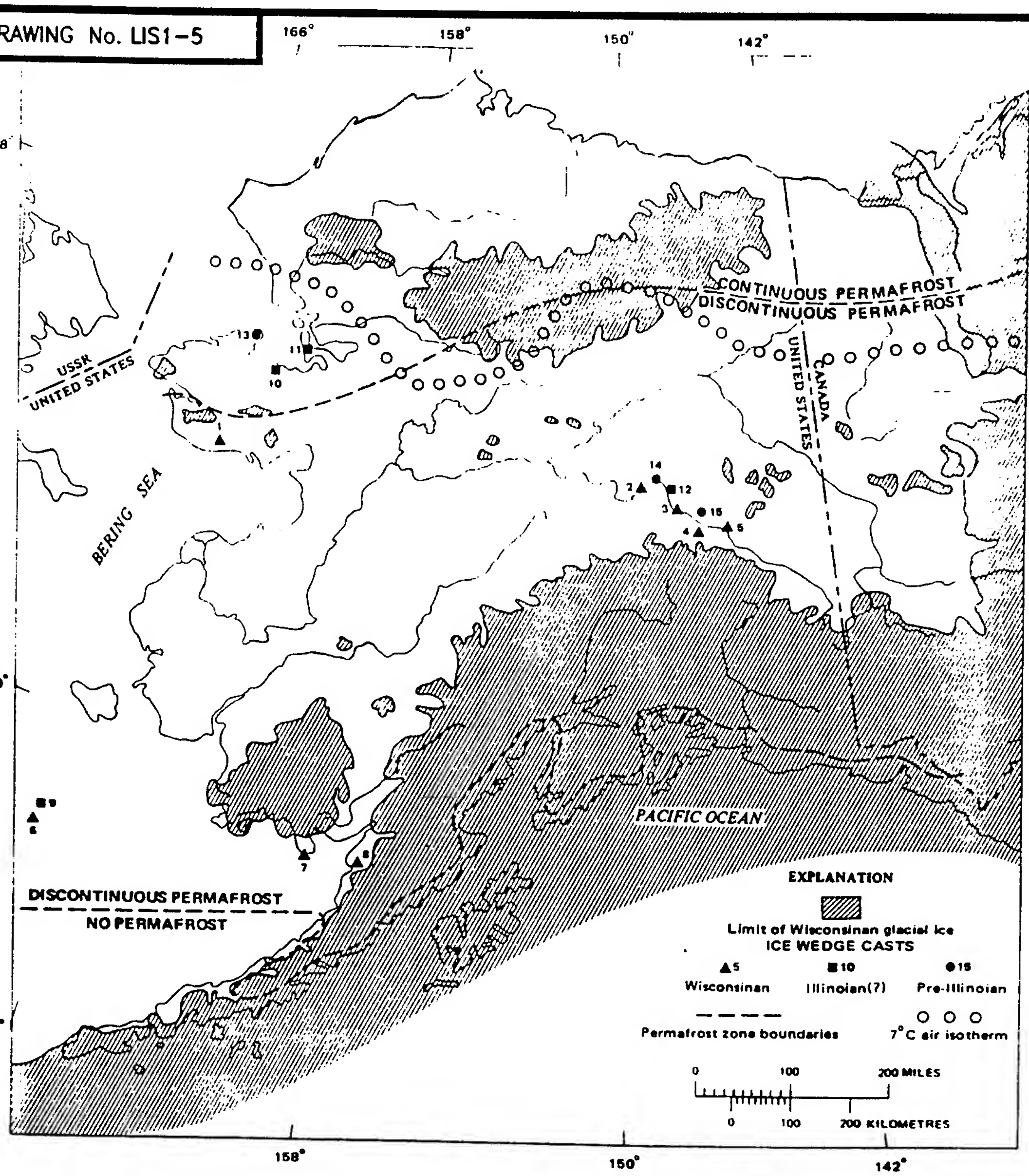
DRAWING No. LIS1-5



SOURCE: Pewe 1975

ALASKA REMOTE RADAR INSTALLATIONS

USAF 611th CES

FIGURE NO. 1-5

PERMAFROST MAP

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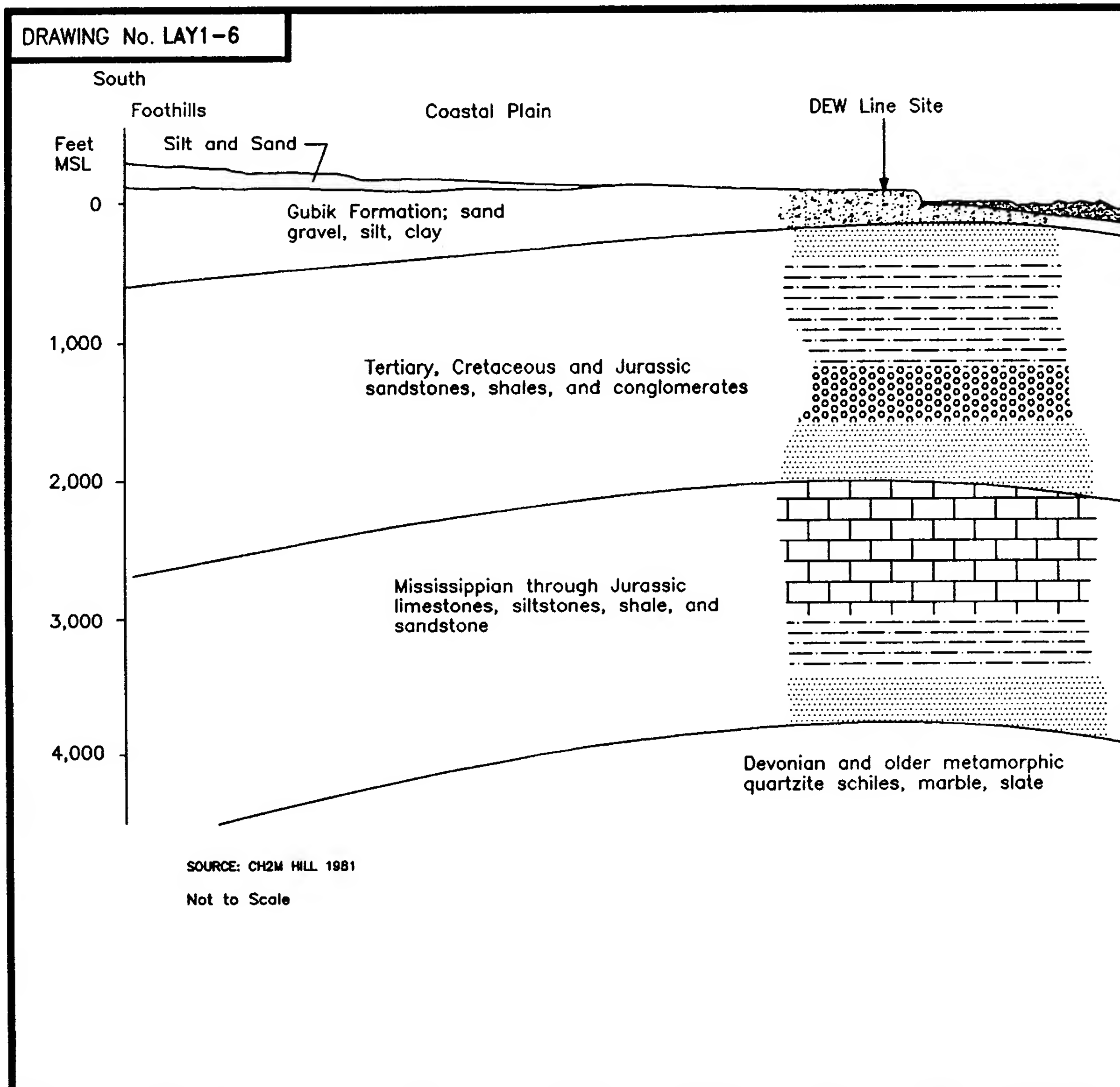

ALASKA REMOTE RADAR INSTALLATIONS

USAF 611th CES

FIGURE NO. 1-6

GENERALIZED NORTH-SOUTH GEOLOGIC CROSS SECTION

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of marine silt and sand of the lower Barrow units of the Gubik Formation have been found at depth.

This area tends to be relatively free of historic earthquakes, although Grantz et al. (1980, 1982) reported several offshore faults or folds that displace Pleistocene deposits. The nearest such feature is 50 miles north of Point Barrow.

Coastal beach erosion is between six and 20 feet per year. The removal of large quantities of gravel from barrier islands has resulted in erosion rates as much as five times higher than before gravel removal (NPRA Task Force 1979). Coastal retreat from 1948 to 1969 varied from 13 to 226 feet in the Barrow-NARL segment (NPRA Task Force 1979).

1.2.4 Hydrology

Ground water/permafrost and surface water are discussed in the following sections.

1.2.4.1 Ground Water/Permafrost. Permafrost has a profound influence on Alaska's ground water resources. Permafrost is defined by the *Glossary of Geology* (American Geological Institute 1972) as:

- Any soil, subsoil, or other surficial deposit, or even bedrock, occurring in arctic or subarctic regions at a variable depth beneath the earth's surface in which a temperature below freezing has existed continuously for a long time (from two years to thousands of years). This definition is based exclusively on temperature and disregards the texture, degree of compaction, water content, and lithologic character of the material.

Permafrost has a major impact on the relationship between surface water and ground water in cold regions such as Alaska. Although ground water in permafrost regions follows the same geologic and hydrologic principles as in temperate areas, the hydrologic regime is modified in the following ways:

- Permafrost acts as an impermeable barrier to the movement of ground water because pore spaces are ice-filled in the zone of saturation. Recharge and discharge are, therefore, limited to unfrozen channels penetrating the permafrost zone. The unfrozen channels are termed perforating taliks. Permafrost restricts the downward percolation of water and increases runoff, enhancing the creation of lakes and swamps (Feulner et al. 1971).

- Permafrost zones tend to reduce evapotranspiration. The generally low ground temperatures tend to reduce direct evaporation and transpiration (the escape of moisture through plant tissue into the air). Vegetation growth is enhanced near large surface water bodies where permafrost usually occurs at greater depth.

- Permafrost restricts an aquifer's storage capacity and the number of locations from which ground water may be withdrawn. Subpermafrost ground water occurs beneath the permafrost zone and is usually dependable. Suprapermafrost water occurs in the active zone, above the permafrost table, and tends to be seasonal; it freezes during the cold winter months.

- The ground water temperature varies from 32 to 40.1°F in permafrost regions because of the low ground temperatures (Williams 1970). Water tends to be more viscous in this temperature range and, therefore, moves slower than in temperate regions.

Low ground temperatures create the necessary environment for permafrost to form. The segment above the permafrost table is called the active zone, because it freezes and thaws with seasonal weather changes. The permafrost zone remains frozen year-round. The active zone is significant because suprapermafrost active zone water exists within it.

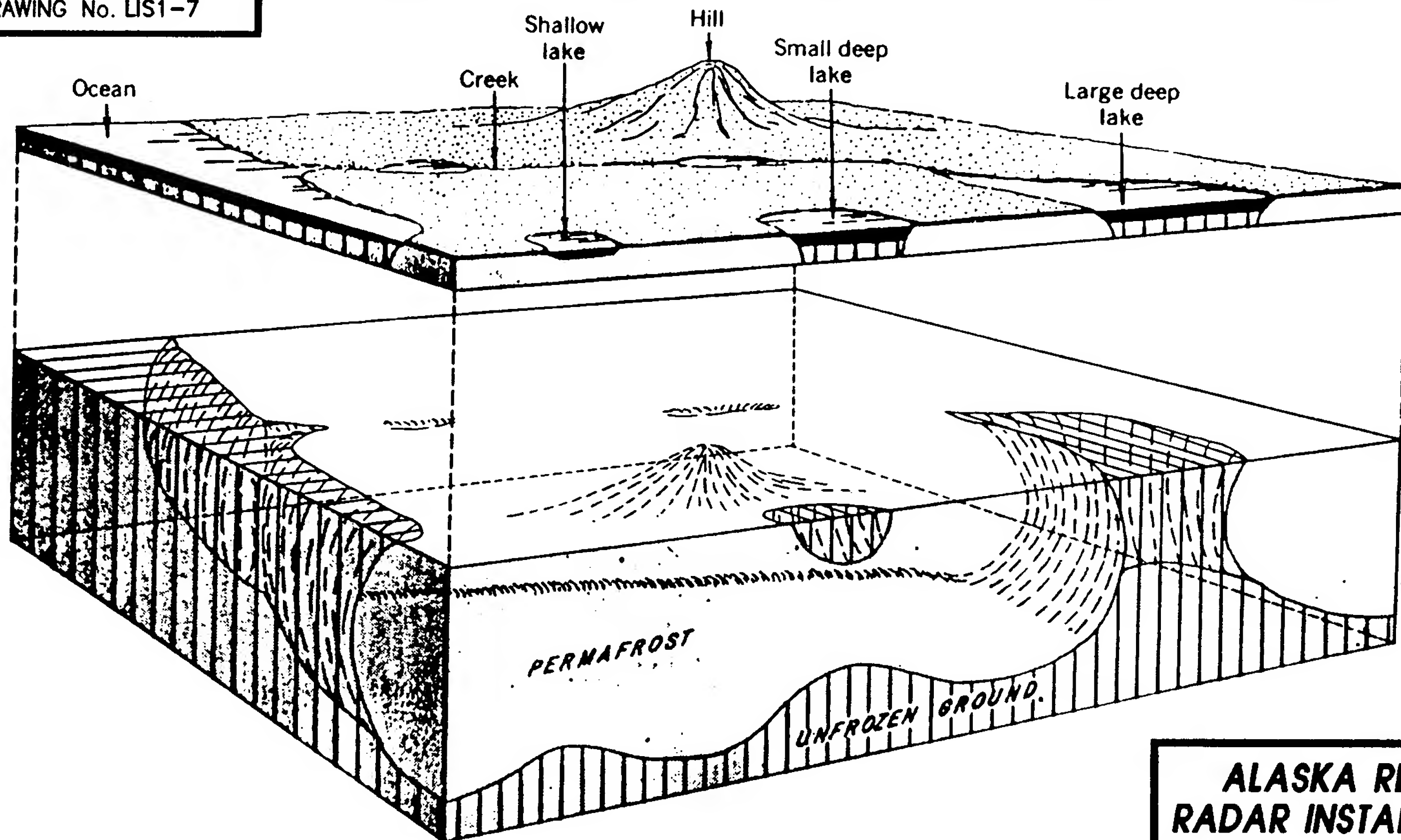
Ground water has been found in aquifers beneath the continuous permafrost, but little is known of these aquifer systems. Shallow ground water sources are also present in river gravel and in thaw bulbs beneath deep lakes. Active zone water is found during the summer months when this layer thaws, but the layer is relatively thin. The thickness of the active zone at Point Barrow is estimated to range from one to six feet.

Surface features may have dramatic impacts on the subsurface distribution of permafrost because they influence heat transfer. Heat flow through surface water is greater than through land. Permafrost may be discontinuous or present at greater depth under and near large bodies of water such as rivers or deep lakes. Smaller bodies of water may affect the configuration of the permafrost surface or the total thickness of the permafrost at any given point. Figure 1-7 is a generalized representation of the relationship of surface features to the underlying permafrost.

1.2.4.2 Surface Water. At the Point Barrow installation, surface drainage occurs as supra-permafrost sheet flow and shallow creek runoff into North Salt Lagoon, Imikpuk Lake, or the Chukchi Sea. Drainage in the southern portion of the facility is relatively poor as a result of the flat topography and the high-centered polygons that have developed. Surface water occupies depressions between these polygons. Swampy areas occur to the south and east of the main station facilities. The surface water drainage features in the vicinity of the installation are shown on Figure 1-8.

North Salt Lagoon has a surface area of about four acres with an outlet on the northeast side to Elson Lagoon. The freshwater lake, Imikpuk Lake, west of the facility has a surface area of about 1.8 acres. Some water for the Point Barrow installation is obtained from this lake, which has an intake pier on the north shore. High tides generated by storms can breach the thin sand bar that separates the freshwater lake from ocean water, thereby contaminating this source of potable water (NPRA Task Force 1979). Potable water for the city of Barrow is also obtained from another lake to the southwest.

DRAWING No. LIS1-7



SOURCE: Selkregg 1975

ALASKA REMOTE RADAR INSTALLATIONS

USAF 611th CES

FIGURE NO. 1-7

SURFACE FEATURE IMPACTS ON PERMAFROST DISTRIBUTION

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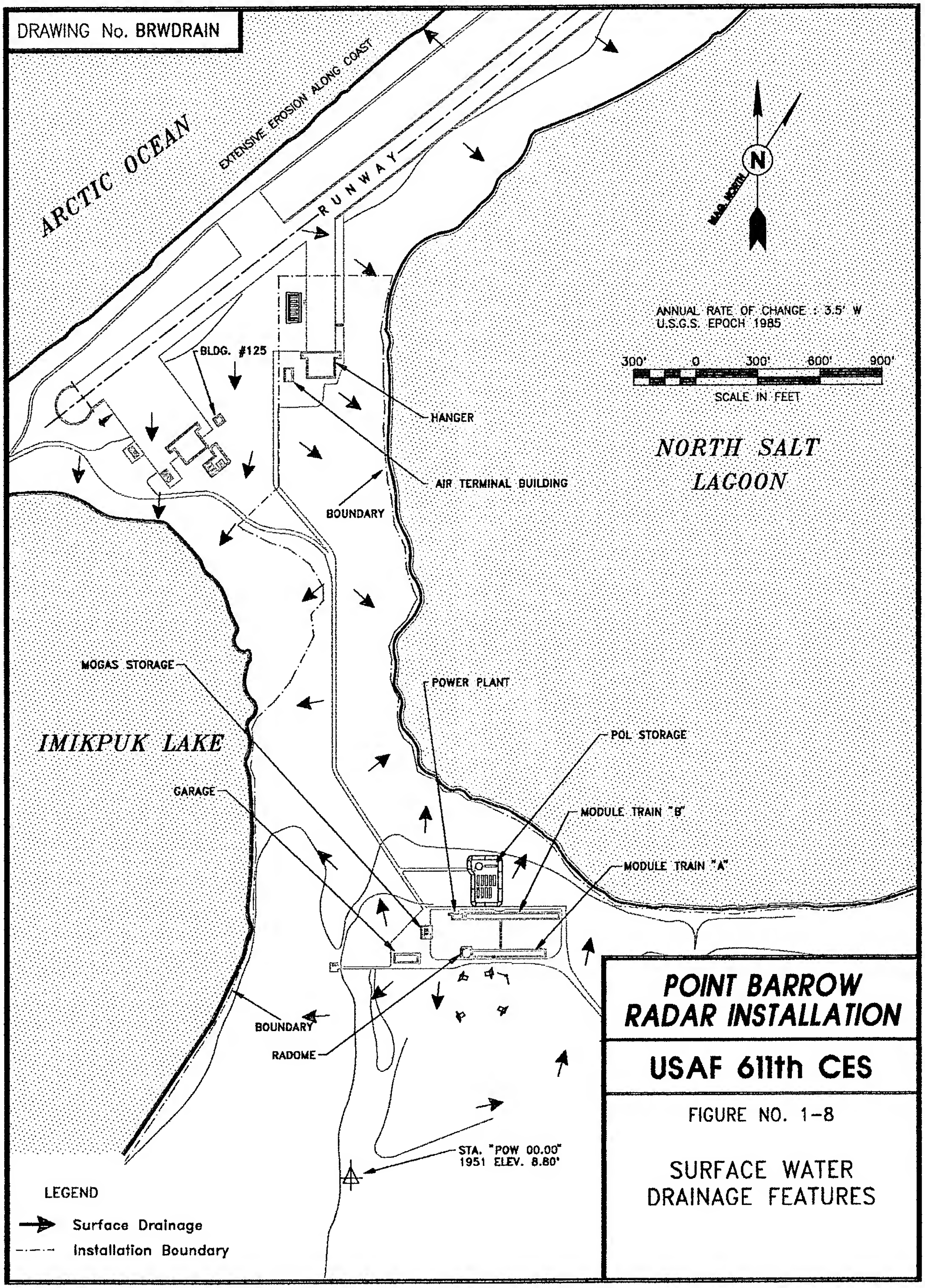
DRAWING No. BRWDRAIN
ARCTIC OCEAN
EXTENSIVE EROSION ALONG COAST
RUNWAY
N
ANNUAL RATE OF CHANGE : 3.5' W
U.S.G.S. EPOCH 1985
300' 0 300' 600' 900'
SCALE IN FEET
BLDG. #125
HANGER
AIR TERMINAL BUILDING
BOUNDARY
NORTH SALT LAGOON
MOGAS STORAGE
POWER PLANT
IMIKPUK LAKE
POL STORAGE
GARAGE
MODULE TRAIN "B"
MODULE TRAIN "A"
BOUNDARY
RADOME
STA. "POW 00.00"
1951 ELEV. 8.80'
LEGEND
Surface Drainage
Installation Boundary
POINT BARROW RADAR INSTALLATION
USAF 611th CES
FIGURE NO. 1-8
SURFACE WATER DRAINAGE FEATURES

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1.2.5 Industrial Activities

Primary industrial activities at the installation include operation and maintenance of the radar system. The Point Barrow radar installation was built to support the air defense system in Alaska. The installation became operational in 1953 when communications were provided by high frequency radio. The original equipment still remains but was replaced with new Long Range Radar and satellite earth terminal systems, which are presently operational. Other industrial activities include maintenance associated with facility operation such as minor construction, road upkeep, and vehicle maintenance. Currently there are approximately four people stationed at the Point Barrow installation. In the 1970s there were approximately 80 military personnel stationed at the installation to manage the facilities.

Presently, radar equipment, primarily the radome is located at the west end of Module Train A. The Point Barrow installation consists of the two module trains ("A" and "B"), rotating radar, garage, warehouse, POL tanks, air terminal building, runway, and facilities to provide full logistics support for the rest of its sector. The two module trains are connected by a skybridge, and they contain the electric equipment work areas and the radar tower, personnel quarters, administration offices, a mechanical room with emergency boiler and fuel storage, a personnel support module with water storage, shower, and toilets, and dining, kitchen, and recreation areas. Adjacent to this structure and connected by a corridor is the power plant.

1.2.6 Biology

This section presents information on the regional fauna and flora of the Point Barrow area.

1.2.6.1 Vegetation. The vegetation of the Point Barrow installation is characteristic of wet sedge meadow complexes. Sedges, particularly *Carex aquatilis*, arctic bluegrass, *Poa arctica*; tundra grass, *Dupontia fischeri*; and mosses predominate. Pond systems contain pendent grass, *Arctophila fulva*; buttercup, *Ranunculus pallassi*; marsh marigold, *Caltha palustris*; and the mosses *Calliergon* and *Drepanocladus* spp. Plants associated with marine zones, including the sedge, *Carex subspathacea*; alkali grass, *Puccinellia phyrganodes*; and chickweed, *Stellaria cochlearia*, occur between the facility and North Salt Lagoon (Hart Crowser 1987; NPRA Task Force 1978; and Bergman et al. 1977).

1.2.6.2 Fishes. Fishes present in the area include marine, anadromous, and freshwater species that seasonally use North Salt Lagoon, Imikpuk Lake, and the various wetlands surrounding the installation. These species include boreal smelt, *Osmerus eperlanus*; arctic cod, *Boreogagus saida*; arctic char, *Salvelinus alpinus*; arctic cisco, *Coregonus autumnalis*; grayling, *Thymallus arcticus*; pink and chum salmon, *Oncorhynchus* spp.; fourhorn sculpin, *Myoxocephalus quadricornis*; Alaska blackfish, *Dallia pectoralis*; and nine-spined stickleback, *Pungitius pungitius* (Hart Crowser 1987).

1.2.6.3 Birds. The Point Barrow installation is in the major migration corridor for millions of shorebirds and waterfowl. Numerous species pass through and are reported to breed in the

Barrow area. Breeding species include Lapland longspur, *Calcarius lapponicus*; red phalarope, *Phalaropus fulicarius*; dunlin, *Calidris alpina*; pectoral sandpiper, *C. melanotos*; pintail, *Anas acuta*; black guillemot, *Cepphus grylle*; pomarine jaeger, *Stercorarius pomarinus*; semipalmated sandpiper, *Calidris pusillus*; and snowy owl, *Nyctea scandiaca*.

Nearshore lagoons and coastal lake systems are important to migratory birds during molting and pre-migratory staging. Principal species using the area during molting and staging include eiders, *Somateria* spp.; oldsquaw, *Clangula hyemalis*; brant, *Branta bernicla*, and other geese, *Chen* and *Branta* spp.; and numerous shorebirds.

Non-migratory species that reside near the installation include the snowy owl; ptarmigan, *Lagopus* spp.; and common raven, *Corvus corax*. Populations of resident species may fluctuate as functions of weather and food availability; snowy owls are particularly sensitive to the cyclic fluctuations in lemming populations.

1.2.6.4 Mammals. Marine mammals that use the waters offshore of Point Barrow include beluga whale, *Delphinapterus leucas*; bowhead whale, *Balaena mysticetus*; and gray whale, *Eschrichtius robustus*, during their annual migrations. Ringed seals, *Phoca hispida*, are abundant in winter and are associated with the shear zone between pack ice and shorefast ice. They are occasionally seen in nearshore lagoons in the summer. Bearded, *Erignathus barbatus*, and spotted seals, *Phoca largha,* are also found in the area. Polar bears, *Ursus maritimus*, are occasionally in the area during the winter preying on ringed seals, but are present less often in the summer.

Terrestrial mammals of the Point Barrow installation include those typically associated with wet sedge tundra. Masked shrews, *Sorex cinereus*, occur throughout the area, but the predominant small mammal is the brown lemming, *Lemmus trimucronatus*, which shows a characteristic cyclic population fluctuation. Arctic fox, *Alopex lagopus*, range widely throughout the area and barren-ground caribou, *Rangifer tarandus*, from the western arctic herd may reach the coast near the Point Barrow installation during summer dispersal.

1.2.6.5 Threatened and Endangered Species. Threatened or endangered species potentially occurring in the vicinity of the Point Barrow installation include the spectacled eider, *Somateria fischeri* (threatened), Steller's eider, *Polysticta stelleri* (candidate for listing as threatened), and bowhead whale (endangered). According to surveys done by Alaska Biological Research (1994), neither the spectacled nor Steller's eiders were found at the Point Barrow installation, although a moderate potential for these species' presence exists based on suitable nesting and/or brood-rearing habitat near the installation. The bowhead whale may pass offshore of the installation during migration. The arctic peregrine falcon, *Falco peregrinus tundrius*, and gray whale, two previously listed species with potential to occur near the installation, were delisted by the U.S. Fish and Wildlife Service as of 5 October 1994, and by the National Marine Fisheries Service as of 16 June 1994.

1.2.7 Demographics

Approximately four contract personnel are stationed at the Point Barrow installation. The city of Barrow has a population of approximately 3,469 (U.S. Bureau of the Census 1991). Barrow has experienced substantial population growth, primarily because of its role as a government services center and because it is the seat of both the NSB and the Arctic Slope Regional Corporation.

1.2.7.1 Local Economy. The population growth at Barrow is due to the employment opportunities that both the NSB and the Arctic Slope Regional Corporation have created for local residents as well as for people from outside the region. Subsistence activities, however, continue to play an important role in the Inupiat culture.

The NSB has assumed area-wide responsibility for a wide range of municipal services, including programs to provide communities with basic life, health, and safety support. In Barrow, the NSB provides education and police protection; health and social services are provided by federal and state agencies (NPRA Task Force 1978). The city operates a community center and maintains an active recreation department. Power is provided by the Barrow Utility Company, and gas is supplied by the Barrow gas field. The Barrow utilidor system is designated to provide the city with piped water and sewer services (Hart Crowser 1987).

A large number of Barrow's residents (over 200) chose to hold their land in a special status available to Alaska Natives that restricts their ability to sell or transfer the property, but exempts it from taxation or regulatory codes. Approximately 34 acres of land in Barrow is held in this restricted status.

Military land within the Barrow corporate limits includes portions of land withdrawn by the Navy for the NARL reserve and land withdrawn by the Air Force for the Point Barrow DEW Line station. With the exception of one native allotment south of the airport and two native allotments adjacent to upper Isatkoak Lagoon, all remaining lands within the Barrow corporate limits have been conveyed to the Ukpeagvik Inupiat Corporation under terms of the Alaska National Interest Lands Conservation Act of 1980 (Alaska Consultants, Inc. 1983).

1.2.7.2 Cultural Resources. Table 1-1 lists archeological, historical, and traditional sites found in the vicinity of Point Barrow. Three of the sites are currently listed in the National Register of Historic Places, and another has been determined eligible for the register. The large number and variety of sites indicate that the Point Barrow area has been used for village settlements as well as a variety of subsistence activities for several thousand years. The area has historical significance as well, because several early exploration parties wintered in the area and non-native whaling occurred in the vicinity.

1.2.7.3 Recreation. The principal recreational facilities along the arctic coast are located near Barrow. Regularly scheduled air service connects the area to Fairbanks, Prudhoe Bay, and Anchorage. Regularly scheduled small plane service connects Barrow with several other North Slope communities, and charter air service is available for local access throughout the year. Sea travel provides transportation during the ice-free period between mid-July and September.

TABLE 1-1. KNOWN CULTURAL RESOURCE SITES IN THE VICINITY OF POINT BARROW RADAR INSTALLATION[a]

SITE NAME	TLUI #[b] / AHRS #	DESCRIPTION	LOCATION
Kayuqtualuk	22 / --	Mythological significance; no visible remains.	Point Barrow area.
Kali	24 / --	Mound associated with local mythology; 1920s graveyard present.	Immediate vicinity of Point Barrow, to the southwest.
None	26 / --	Remnants of undated house structure and possible burials, reportedly disturbed during Point Barrow construction.	Kokolik River, approximately 1.5 miles northeast of Point Barrow.
Point Barrow	-- / XPL-053	Village site abandoned in 1953 with school closure; extant buildings, occupied during summer months.	On Barrier Island, approximately two miles northwest of Point Barrow.
Niaquq or Singigruaq	11 / --	Ancestral home of some Point Barrow residents.	15 miles south of Point Barrow.

a Data from Hart Crowser (1987); Alaska Division of Geological and Geophysical Survey Records (1984).
b TLUI = Traditional Land Use Inventory.
AHRS = Alaska Heritage Resources Survey.

Snowmobiles provide the basic mode of transportation; however, automobiles, bikes, all-terrain vehicles (ATVs), and small boats are also used.

Recreational use by non-residents is associated primarily with tourist activities in Barrow and sightseeing in the immediate vicinity. Barrow is the center of tourism for the entire North Slope, and virtually all tourism facilities are located there. The majority of recreation-oriented visits to the vicinity are associated with organized tours to Barrow. These recreational pursuits include camping, hiking along coastal beaches, wildlife viewing, and observation of the lifestyle and crafts of the native Eskimo. Recreational use of the lands in the vicinity of the Point Barrow by local residents consists of indoor activities such as movies at the school gymnasium and outdoor activities such as snowmobiling, riding ATVs, and dog sled racing.

1.3 SITE INVENTORY

This section presents information on the IRP sites at the Point Barrow radar installation. It includes summaries of previous IRP activities and remedial actions that have been conducted at the installation.

1.3.1 Sites at Point Barrow

Three sites at the Point Barrow radar installation were investigated during the 1993 RI activities. One of these sites was determined to be of concern based on previous IRP sampling data. Additionally, there were two sites identified for investigation based on previous IRP activities and the 1993 RI activities. The one site previously sampled is the Air Terminal Area (SS03). Sampling at this area determined that contaminants were present. Additional sites were identified based on previous IRP activities as listed: literature search, pre-survey and reconnaissance trips, communication with personnel from ADEC, and information on disposal practices at DEW Line stations. The additional sites include the Diesel Fuel Spill Area (SS01) and the Garage (SS02).

It should be noted that none of the sites is on or is proposed to be included on the National Priority List (NPL) of Superfund sites.

1.3.2 Previous IRP Activities

An Air Force contractor conducted Phase I Installation Assessment/Records Search activities at the Point Barrow installation and six other DEW Line stations in 1980 and 1981 (CH2M Hill 1981). Phase I activities included a detailed review of pertinent installation records from both government and civilian contractors, contacts with various government and private agencies for documents relevant to the program, and onsite visits during July and August 1981. The onsite visits included interviews with key installation employees, ground tours of installation facilities, and plane overflights to identify past disposal and possible contaminated areas.

An Air Force contractor prepared the Technical Support Document of Record of Decision, Point Barrow (POW-M) DEW Line installation in December 1987 (Woodward-Clyde 1987). One potential hazardous waste site was identified in Phase I. No further action was recommended in the Record of Decision.

Correspondence from ADEC personnel to Air Force personnel in November 1991 disagreed with the no further action conclusion and stated that further investigation was needed and that corrective action appeared necessary because of improper waste disposal practices and other issues.

A contractor prepared the Environmental Assessment for North Warning System (Alaska), in January 1987 (Hart Crowser 1987). The report, although not an IRP activity, discussed the impacts of retrofitting with Long Range Radar equipment at the Point Barrow DEW Line installation.

In 1991, a non-Air Force investigation studied the Air Terminal Area (Shannon and Wilson 1991). This investigation was conducted by the Navy, which previously conducted operations at the Air Terminal Area.

1.3.3 Previous Remedial Actions

There are no remedial actions taking place at this time and there are no known remedial actions previously conducted at the Point Barrow installation.

2.0 PROJECT ACTIVITIES

This section of the report describes the project objectives and scope, the RI field program and methodology, the analytical programs, background sampling, and analytical results. In addition, data evaluation, risk estimate methodologies, potential migration pathways, and receptors are presented.

2.1 PROJECT OBJECTIVES AND SCOPE

The objectives of the Point Barrow DEW Line radar installation RI/FS are to confirm the presence or absence of chemical contamination in the environment at the installation; define the extent and magnitude of confirmed chemical releases; gather adequate data to determine the magnitude of potential risks to human health and the environment; and gather adequate data to identify and select the appropriate remedial actions for sites where apparent risks exceed acceptable limits or contamination exceeds regulatory guidelines. The project objectives include the following goals:

- Define the horizontal and vertical extent of soil contamination and the range of contaminant concentration;
- Determine the physical and chemical properties of soil contaminants to describe contaminant toxicity and mobility;
- Define the extent of surface and active zone water contamination and the range of contaminant concentrations;
- Describe real and potential surface and subsurface contaminant migration pathways in terms of movement of dissolved and suspended contaminants through the active zone above permafrost, and movement of dissolved and suspended contaminants in surface water;
- Generate adequate valid data to support development of a baseline risk assessment that quantifies, to the extent possible, potential risks to human health and the environment posed by COCs at the Point Barrow DEW Line installation studied under this RI; and
- Select the most feasible remedy, cleanup action, to reduce risks at sites where risks exceed acceptable limits.

2.2 RI FIELD ACTIVITIES

This section presents a summary of the field activities conducted during the RI, the organization of the RI field team, and the chronology of field work.

2.2.1 RI Field Program

The RI field program at the Point Barrow radar installation was carried out in accordance with the RI/FS Work Plan, the SAP, and the Health and Safety Plan (U.S. Air Force 1993a,b,c). These RI/FS planning documents were developed as specified in the Delivery Order No. 22 Statement of Work (Appendix C) and IRP Handbook (U.S. Air Force 1991).

The scope of the field investigation was described in detail in the Field Sampling Plan (U.S. Air Force 1993b). The field activities included the following:

- Collecting and analyzing surface and subsurface soil samples from sites with potential or confirmed soil contamination. These soil samples were described and analyzed for petroleum and other chemical residues. Samples were collected using hand tools.

- Collecting and analyzing samples of surface water from potentially affected streams, surface water features such as lakes or ponds, and any apparent leachate discharge points.

- Collecting and analyzing background samples to characterize natural background conditions.

- Measuring relative surface elevations of sampling points and stream channels to determine surface slopes and stream gradients.

- Collecting samples of potential chemical residues and waste materials at sites where such materials were suspected and had not yet been characterized.

- Conducting real-time air monitoring using portable field instruments.

- Measuring surface distances and approximate elevations to locate sampling points relative to fixed reference points.

The RI activities described above were carried out in three phases as follows:

- Installation Pre-Survey. The pre-survey was conducted by a small group of contractor employees (four total) accompanied by Air Force representatives. The purpose of the pre-survey was to confirm the location of areas of environmental concern at the installation. Pre-survey activities were limited to visual inspection of the sites, surface distance measurements, site photography, and confirmation of the location of structures and sites as shown on installation plan maps. The information gathered from the pre-survey was combined with existing documentation to support development of the RI/FS scoping documents. The pre-survey was completed at the Point Barrow installation on 13 May 1993 by an Air Force contractor.

- Installation Reconnaissance. The installation reconnaissance was conducted by a group of contractor employees on 25 June 1993. The purpose of the reconnaissance was to identify sampling locations for investigation during the RI. The contractor staff made detailed observations of potentially contaminated areas and performed limited intrusive activities (e.g., digging shallow holes with a shovel to determine the apparent depth of contamination at areas of soil staining). Data gathered during the installation reconnaissance provided the basis for determining the sites to be sampled, the approximate number of samples and their locations, analyses for each sample, and equipment and supply needs for the RI.

- Remedial Investigation Field Activities. The RI field activities were conducted from mid-August through early September of 1993. The RI was conducted in conjunction with RIs at seven other radar installations located throughout northern Alaska. Fifteen contractor employees were stationed in Alaska for the duration of the RI. Intrusive sampling activities at the Point Barrow radar installation included collection of surface and subsurface soil samples with hand tools (e.g., shovels, scoops, bucket augers) and collection of surface water, sediment, and seep samples from potentially contaminated areas. The RI activities also included operation of temporary northern Alaska (Barrow, Alaska) laboratory facilities operated by a subcontractor.

2.2.2 Field Team Organization and Subcontractors

The organization of the RI field team, the responsibilities of the RI team members, and subcontractors used during RI activities are presented in Figure 2-1 (Note: all Point Barrow sampling was conducted by the "B" RI Field Sampling Team). The Air Force Center for Environmental Excellence (AFCEE) restoration team chiefs that managed and conducted oversight of the RI field activities included Mr. Marty Faile, Mr. Mike McGhee, and Mr. Samer Karmi.

2.2.3 Chronology of Field Work

The RI field work at the Point Barrow radar installation conducted during summer 1993 was accomplished in the following chronological order:

13 May	Conducted pre-survey
25 June	Conducted reconnaissance
08 August	Staged equipment and supplies at Point Barrow.
26 August	Staked sampling locations at SS01, SS02, SS03, and background areas. Collected eight soil and eight water samples at SS03, five soil and two water background samples, and two Quality Assurance/Quality Control (QA/QC) samples.

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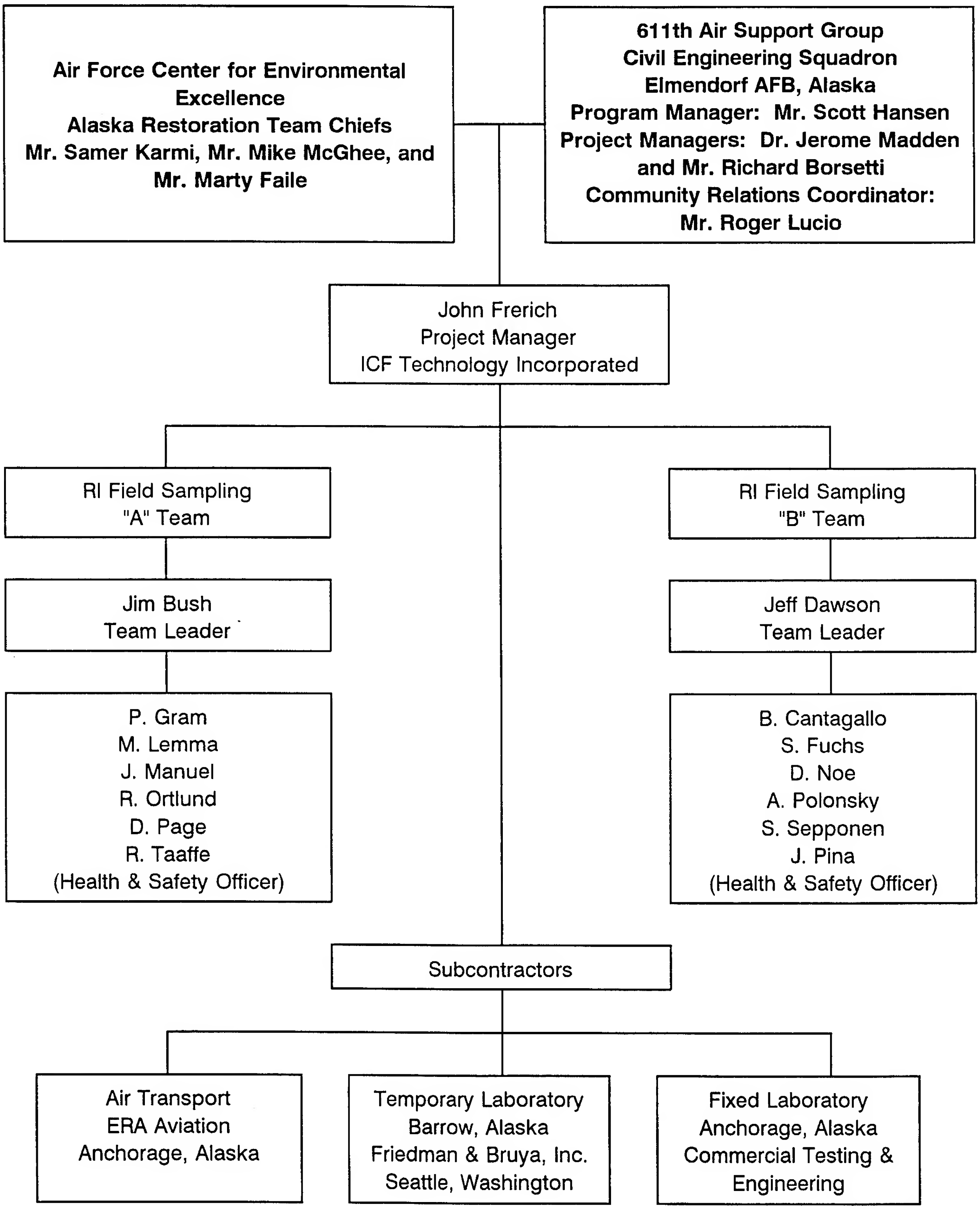
FIGURE 2-1. FIELD TEAM ORGANIZATION



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27 August	Collected 11 soil and 8 water samples at SS01, 6 soil samples at SS02, 7 soil samples at SS03, and 3 QA/QC samples.
06 September	Staked and collected 10 soil samples at SS01, 1 soil sample at SS02, 7 soil samples at SS03, and 2 QA/QC samples.

2.3 RI SAMPLING AND ANALYSES

A summary of the RI sampling and analysis activities conducted during this investigation is presented in this section. Included are descriptions of the number of samples collected by media, QA/QC samples collected, background sampling and analyses, analytical programs, chronology of laboratory analyses, laboratory QA/QC programs, and data validation and reporting.

2.3.1 Sampling Procedures

Contractor personnel collected samples from various media at the Point Barrow radar installation using numerous sample collection methods and procedures. The collection methods were determined at the time of collection, based on sample location and prevailing environmental conditions. Media sampled during the RI included surface and subsurface soils, surface water, and sediment. These media were extracted generally from man-emplaced fill, gravel pads, and scraped areas; and natural tundra soils/sediments and surface water bodies. All sampling tools or other devices used during sampling were decontaminated before use. Standard procedures, developed by the contractor for sampling methodologies used during the RI are presented in Appendix D of the RI/FS SAP (U.S. Air Force 1993b). Sample collection logs for all samples collected during RI activities at the Point Barrow installation are presented in Appendix D. The logs provide detailed sample information such as media, location, depth, and analyses requested. Completed chain-of-custody forms for all samples collected during the RI at the Point Barrow installation are presented in Appendix E.

2.3.2 Summary of RI Sampling

Contractor personnel collected 80 samples from various media at the Point Barrow radar installation. Seven samples were collected to determine organic and inorganic background concentrations in soil/sediment and surface water. Fourteen samples were collected for QA/QC. QA/QC samples included duplicates, replicates, equipment rinsate blanks, trip blanks, and ambient condition blanks. Fifty-nine samples were collected to determine the nature and extent of contamination at the three sites at Point Barrow. Table 2-1 presents a summary of RI sampling conducted at Point Barrow.

2.3.2.1 Field QA/QC Samples. The field QA/QC program consisted of QA/QC samples, quality control (QC) checks, and limits for field procedures.

TABLE 2-1. SUMMARY OF POINT BARROW REMEDIAL INVESTIGATION FIELD SAMPLING ACTIVITIES

ACTIVITY	TOTAL
Water Samples Collected for Lab Analyses (includes QA/QC)	26 samples
Soil/sediment Samples Collected for Lab Analyses (including QA/QC)	55 samples
TOTAL WATER AND SOIL SAMPLES FOR LAB ANALYSES	81 samples[a]

a Investigation derived wastes (IDW) from Point Barrow were combined with the IDW from Point Barrow, Point Lonely, and Wainwright. These were collectively sampled during the Point Barrow investigation, and the total includes one IDW sample.

QA/QC Samples. QA/QC samples collected during this investigation included duplicate water samples, replicate soil/sediment samples, trip blanks, ambient condition blanks, and equipment rinsate blanks.

During RI sampling activities at the Point Barrow installation, QA/QC samples collected included the following: two duplicate water samples, five replicate soil/sediment samples, four trip blanks, one ambient condition blank, and two equipment rinsate blanks. Table 2-2 summarizes all samples collected and analyzed during RI activities at the Point Barrow installation, including the QA/QC samples.

In addition to the above QA/QC samples, extra volumes of selected samples were collected and submitted for internal laboratory QA/QC (matrix spike and matrix spike duplicates). Extra sample volumes were submitted at a minimum of 1 per 10 samples. Extra volumes submitted included triple volume for organic water analyses and double volume for inorganic water analyses.

2.3.2.2 Background Sampling and Analyses. Seven background samples were collected from upgradient areas during field activities at the Point Barrow radar installation to establish background concentrations for naturally occurring organic compounds. In order to obtain a representative range of inorganic (metal) concentrations in soil/sediments and surface waters of the North Slope, 44 samples (29 soil/sediment and 15 water) from seven North Slope radar installations were collected. The seven installations include Barter Island, Bullen Point, Oliktok Point, Point Lonely, Point Barrow, Point Lay, and Wainwright. Approximately five soil/sediment and two surface water background samples were collected from each of these installations to determine the background concentrations of inorganic analytes across similar coastal arctic environments of the North Slope.

Seven background samples were collected from tundra and pond areas during the RI at Point Barrow. These consisted of four soil, one sediment, and two surface water samples.

(1)

TABLE 2-2. SUMMARY OF SAMPLING AND ANALYSES CONDUCTED F(

ANALYSES	HVOC*	BTEX*	VOC 8260	SVOC	Metals[b]	TPH-Diesel[b] Range 3510/3550	TPH - Gasoline Range
ANALYTICAL METHOD	SW8010M	SW8020	SW8260	SW8270	SW3050 (Soil) 3005 (Water)/6010	Diesel 8100 M	Gas 5030/8015
POINT BARROW (POW-M)							
Background (BKGD)	5 Soil 2 Water	5 Soil 2 Water	1 Soil 2 Water	5 Soil 2 Water	5 Soil 2 Water (Total) 2 Water (Dissolved)	5 Soil 2 Water	5 Soil 2 Water
Diesel Fuel Spill (SS01)	NA	12 Soil 7 Water	2 Soil 1 Water	2 Soil	NA	20 Soil 7 Water	11 Soil 7 Water
Garage (SS02)	5 Soil	5 Soil	2 Soil	1 Soil	1 Soil	6 Soil	6 Soil
Air Terminal Area (SS03)	12 Soil 7 Water	14 Soil 7 Water	3 Soil 2 Water	2 Soil 2 Water	2 Soil 2 Water (Total) 2 Water (Dissolved)	19 Soil 7 Water	18 Soil 7 Water
Total Field Analyses	22 Soil 9 Water	36 Soil 16 Water	8 Soil 5 Water	10 Soil 4 Water	8 Soil 4 Water (Total) 4 Water (Dissolved)	50 Soil 16 Water	40 Soil 16 Water
QA/QC SAMPLES							
Trip Blanks	2 Water	2 Water	4 Water	NA	NA	NA	2 Water
Equipment Blanks	1 Water	1 Water	2 Water	NA	1 Water (Total)	1 Water	2 Water
Ambient Condition Blanks	NA	NA	1 Water	NA	NA	NA	NA
Field Replicates	3 Soil	4 Soil	1 Soil	1 Soil	1 Soil	5 Soil	5 Soil
Field Duplicates	1 Water	2 Water	1 Water	1 Water	1 Water (Total) 1 Water (Dissolved)	2 Water	2 Water
Investigation Derived Wastes (IDW)	NA	NA	NA	NA	NA	NA	NA
Total Site Analyses	25 Soil 13 Water	40 Soil 21 Water	9 Soil 13 Water	11 Soil 5 Water	9 Soil 6 Water (Total) 5 Water (Dissolved)	55 Soil 19 Water	45 Soil 22 Water

NA Not analyzed.
* These analyses were completed on a quick turnaround basis.
a The number of soil sample includes sediment samples collected from surface water features.
b Some of these analysis were completed on a 24-hour turnaround at a temporary fixed laboratory at Barrow, Alaska.

2

NDUCTED FOR POINT BARROW REMEDIAL INVESTIGATIONS[a]

TPH - Gasoline[b] Range	TPH Residual Range[*]	PCB[*]	Pesticides[*]	TDS	TSS	TOC	TCLP	TOTAL SAMPLES
Gas 5030/8015M	Diesel 8100M	SW8080/8080M	SW8080/8080M	E160.1	E160.2	SW9060	SW1311	
5 Soil 2 Water	5 Soil 2 Water	5 Soil 2 Water	5 Soil 2 Water	2 Water	2 Water	2 Soil 2 Water	NA	5 Soil 2 Water
11 Soil 7 Water	11 Soil 7 Water	NA	1 Soil	1 Water	1 Water	1 Soil 1 Water	NA	20 Soil 7 Water
6 Soil	5 Soil	5 Soil	2 Soil	NA	NA	NA	NA	6 Soil
18 Soil 7 Water	13 Soil 7 Water	7 Soil 7 Water	1 Soil	2 Water	2 Water	2 Soil 2 Water	NA	19 Soil 7 Water
40 Soil 16 Water	34 Soil 16 Water	17 Soil 9 Water	9 Soil 2 Water	5 Water	5 Water	5 Soil 5 Water		50 Soil 16 Water
2 Water	NA	NA	NA	NA	NA	NA	NA	4 Water
2 Water	1 Water	1 Water	1 Water	NA	NA	NA	NA	2 Water
NA	NA	NA	NA	NA	NA	NA	NA	1 Water
5 Soil	4 Soil	2 Soil	1 Soil	NA	NA	1 Soil	NA	5 Soil
2 Water	2 Water	1 Water	NA	1 Water	1 Water	1 Water	NA	2 Water
NA	NA	NA	NA	NA	NA	NA	1 Water	1 Water
45 Soil 22 Water	38 Soil 19 Water	19 Soil 11 Water	10 Soil 3 Water	6 Water	6 Water	6 Soil 6 Water	1 Water	55 Soil 26 Water

Alaska.

Four background soil samples were analyzed for diesel range petroleum hydrocarbons (DRPH), gasoline range petroleum hydrocarbons (GRPH), RRPH, benzene, toluene, ethylbenzene, and xylene (BTEX), halogenated volatile organic compounds (HVOCs), semi-volatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and total metals. In addition, one sample was analyzed for total organic carbon (TOC).

One background sediment sample was analyzed for DRPH, GRPH, RRPH, BTEX, HVOCs, volatile organic compounds (VOCs), SVOCs, pesticides, PCBs, total metals, and TOC.

Two background surface water samples were analyzed for DRPH, GRPH, RRPH, BTEX, HVOCs, VOCs, SVOCs, pesticides, PCBs, TOC, total suspended solids (TSS), total dissolved solids (TDS), and total and dissolved metals.

Data Summary. Background sample locations at Point Barrow are illustrated in Figure 2-2. The data summary, Table 2-3, presents analytical results for all background samples collected at Point Barrow. Detection and quantitation limits, action levels, and the associated field and laboratory blank results are included on the data summary table.

Below is a discussion of organic compounds and inorganic analytes detected in background samples at Point Barrow. A discussion of TDS, TSS, and TOC is included. Analytical results are presented in Table 2-3 and Figure 2-2.

Organics. No organic compounds were detected in background soil or sediment samples.

Only one organic compound, 1,2-dichloroethane, was detected in one background surface water sample collected at Point Barrow at a concentration of 1.2 μg/L. This compound was detected at similar concentrations in numerous field and laboratory blanks associated with samples collected during the 1993 RI activities and was assumed to be the result of field decontamination procedures. The hexane and methanol used in the decontamination procedures may have contained impurities including 1,2-dichloroethane.

The ranges of background concentrations detected for all analytes are presented in data summary tables for each of the three sites presented in Sections 3.0 through 5.0.

Inorganics. Fourteen metals were detected in background soil/sediment samples, and five metals were detected in background surface water samples collected at Point Barrow. The results of inorganic analyses are presented in Table 2-3.

TOC was reported in two soil/sediment samples at 84,200 and 297,000 mg/kg. TOC was reported in background surface water samples BKGD-SW01 and BKGD-SW02 at 16,700 and 22,500 μg/L, respectively. TSS were reported at 5,000 and 6,000 μg/L, and TDS were reported at 16,600 and 213,000 μg/L in the same two respective surface water samples.

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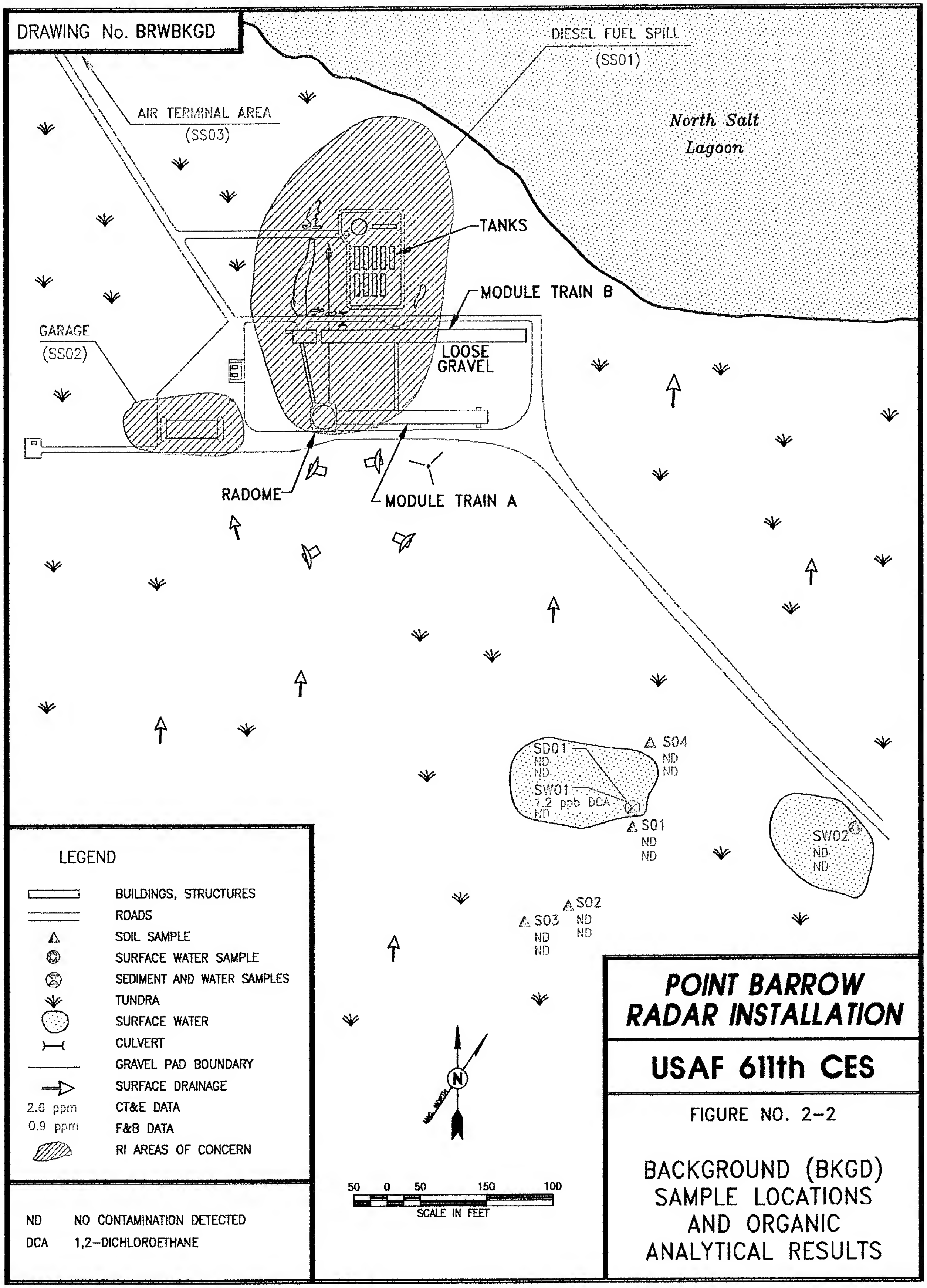

POINT BARROW RADAR INSTALLATION

USAF 611th CES

FIGURE NO. 2-2

BACKGROUND (BKGD) SAMPLE LOCATIONS AND ORGANIC ANALYTICAL RESULTS

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TABLE 2-3. BACKGROUND ANALYTICAL DATA SUMMARY

Installation: Point Barrow   Matrix: Soil/Sediment
Site: Background (BKGD)   Units: mg/kg

Parameters	Detect. Limits	Quant. Limits	Action Levels	Bkgd. Range	Environmental Samples					Field Blanks			Lab Blanks	
					S01	S02	S03	S04	SD01	AB01	EB01	TB01		
Laboratory Sample ID Numbers					820 4397-4	822 4397-5	824 4397-6	826 4397-7	818 4397-1	4395-2	1156/1158 4424-4	776 4395-1	#5-9193 4395 4424	#6-82893 4397
ANALYSES	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/L	µg/L	µg/L	µg/L	mg/kg
DRPH	6.5-18	65-180	500[a]	<65J[b]-<180J[b]	<180J[b]	<170J[b]	<90J[b]	<65J[b]	<80J[b]	NA	<1,000[b]	NA	<200	<50
GRPH	0.3-0.7	3-7	100	<3J[b]-<7J[b]	<7J[b]	<7J[b]	<4J[b]	<3J[b]	<3J[b]	NA	<100J[b]	<50J[b]	NA	NA
RRPH (Approx.)	13-36	130-360	2,000[a]	<130-<360	<360	<340	<180	<130	<150	NA	<2,000	NA	<2,000	<100
BTEX (8020/ 8020 Mod.)			10 Total BTEX	<0.14-<0.31	<0.31	<0.31	<0.19	<0.14	<0.15					
Benzene	0.003-0.007	0.03-0.07	0.5	<0.03-<0.07	<0.07	<0.07	<0.04	<0.03	<0.03	<1[c]	<1	<1	<1	NA
Toluene	0.003-0.007	0.03-0.07		<0.03-<0.07	<0.07	<0.07	<0.04	<0.03	<0.03	<1[c]	<1	<1	<1	NA
Ethylbenzene	0.003-0.007	0.03-0.07		<0.03-<0.07	<0.07	<0.07	<0.04	<0.03	<0.03	<1[c]	<1	<1	<1	NA
Xylenes (Total)	0.005-0.01	0.05-0.1		<0.05-<0.1	<0.1	<0.1	<0.07	<0.05	<0.06	<2[c]	<2	<2	<2	NA
HVOC 8010	0.003-0.007	0.03-0.07		<0.03-<0.07	<0.07	<0.07	<0.04	<0.03	<0.03	NA	<1	<1	NA	NA
VOC 8260	0.020	0.050		<0.050J	NA	NA	NA	NA	<0.050J	<1	<1	<1	<1	<1
SVOC 8270	0.200	3.80-40.0		<3.80-<40.0	<40.0[d]	<18.0[d]	<3.95[d]	<5.9[d]	<3.80[d]	NA	NA	NA	NA	<0.200
Pesticides	0.001-0.05	0.01-0.5		<0.01J-<1.8J	<0.4J-<1.8J	<0.3J-<1.7J	<0.2J-<0.9J	<0.01J-<0.5	<0.01J-<0.5J	NA	<0.2J-<25R	NA	NA	NA
PCBs	0.01-0.04	0.1-0.4	10	<0.1-<0.4J	<0.4J	<0.3J	<0.2J	<0.1	<0.1	NA	<2	NA	NA	<0.1
TOC				84,200-297,000	297,000	NA	NA	NA	84,200	NA	NA	NA	NA	NA

☐ CT&E Data.
▩ F&B Data.
NA Not analyzed.
J Result is an estimate.
R Result has been rejected.
a The action levels for DRPH and RRPH are based on conversations with ADEC; final action levels have not yet been determined.
b DRPH and GRPH concentrations reported for these samples are equivalent to diesel and gasoline range organics (DRO and GRO) as defined by ADEC.
c BTEX determined by 8260 method analysis.
d The laboratory reported that the high detection limit on SVOC 8270 was due to the discoloration of the extract.

TABLE 2-3. BACKGROUND ANALYTICAL DATA SUMMARY (CONTINUED)

Installation: Point Barrow
Site: Background (BKGD)
Matrix: Soil/Sediment
Units: mg/kg
METALS ANALYSES

Parameters	Detect. Limits	Quant. Limits	Action Levels	Bkgd. Range from 7 DEW Line Installations	Bkgd. Range	Environmental Samples					Field Blank	Lab Blanks
						S01	S02	S03	S04	SD01	EB01	
Laboratory Sample ID Numbers						4397-4	4397-5	4397-6	4397-7	4397-1	4424-4	4424 4397
ANALYSES	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/L	µg/L
Aluminum	0.35	2		1,500-23,000	6,300-18,000	6,300	18,000	15,000	14,000	11,000	<100	<100
Antimony	N/A	69-230		<7.8-<230	<69-<230	<230	<170	<75	<69	<120	<100	<100
Arsenic	0.11	6.9-23		<4.9-7.0	<6.9-<23	<23	<17	<7.5	<6.9	<12	<100	<100
Barium	0.024	1		27-390	110-230	110	230	220	150	180	<50	<50
Beryllium	N/A	3.4-11		<2.6-6.4	<3.4-<11	<11	<8.5	<3.8	<3.4	<5.8	<50	<50
Cadmium	0.33	3.4-11		<3.0-<27	<3.4-<11	<11	<8.5	<3.8	<3.4	<5.8	<50	<50
Calcium	0.69	4		360-59,000	1,700-5,700	2,800	3,100	2,700	1,700	5,700	220	<200
Chromium	0.066	1-11		<4.3-47	<11-30	<11	30	24	24	19	<50	<50
Cobalt	N/A	6.9-23		<5.1-12	<6.9-<23	<23	<17	<7.5	<6.9	<12	<50	<100
Copper	0.045	1		<2.7-45	13-20	13	17	20	18	17	<50	<50
Iron	0.50	2		5,400-35,000	19,000-22,000	21,000	22,000	21,000	19,000	22,000	<100	<100
Lead	0.13	2-23		<5.1-22	8.7-<23	<23	<17	9.7	8.7	<12	<100	<100
Magnesium	0.96	4		360-7,400	2,000-4,500	2,000	4,500	3,500	3,200	3,600	<200	<200
Manganese	0.025	1		25-290	49-240	49	86	90	74	240	<50	<50
Molybdenum	N/A	3.4-11		<2.5-<11	<3.4-<11	<11	<8.5	<3.8	<3.4	<5.8	<50	<50
Nickel	0.11	1		<4.2-46	23-25	23	25	23	23	24	<50	<50
Potassium	23	100-1100		<300-2,200	<1,100-2,200	<1,100	2,200	1,600	2,000	2,000	<5,000	<5,000
Selenium	1.2	23-170		<7.8-170	<23-<170	<23	<170	<75	<69	<120	<100	<100
Silver	0.53	34-110		<3-<110	<34-<110	<110J	<85	<38	<34	<58J	<50	<50
Sodium	0.55	5		<160-680	190-640	640	390	220	190	310	<250	<250

☐ CT&E Data.
N/A Not available.
J Result is an estimate.

TABLE 2-3. BACKGROUND ANALYTICAL DATA SUMMARY (CONTINUED)

Installation: Point Barrow
Site: Background (BKGD)

Matrix: Soil/Sediment
Units: mg/kg

METALS ANALYSES

Parameters	Detect. Limits	Quant. Limits	Action Levels	Bkgd. Range from 7 DEW Line Installations	Bkgd. Range	Environmental Samples					Field Blank	Lab Blanks
						S01	S02	S03	S04	SD01	EB01	
Laboratory Sample ID Numbers						4397-4	4397-5	4397-6	4397-7	4397-1	4424-4	4424 4397
ANALYSES	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/L	µg/L
Thallium	0.001	0.32-1.2		<0.2-<0.82	<0.32-<1.2	<1.2	<0.82	<0.39	<0.32	<0.55	<5	<5
Vanadium	0.036	1		6.3-59	18-48	18	48	41	44	39	<50	<50
Zinc	0.16	1		9.2-95	49-61	61	59	49	51	59	<50	<50

☐ CT&E Data.

TABLE 2-3. BACKGROUND ANALYTICAL DATA SUMMARY (CONTINUED)

Installation: Point Barrow
Site: Background (BKGD)
Matrix: Surface Water
Units: µg/L

Parameters	Detect. Limits	Quant. Limits	Action Levels	Bkgd. Range	Environmental Samples			Field Blanks			Lab Blanks
					SW01	SW02		AB01	EB01	TB01	
Laboratory Sample ID Numbers					778/780 4395-3	784/786 4394-1 4395-6		4395-2	1156-1158 4424-4	776 4395-1	#5-9193 4395 4394 4424
ANALYSES	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L		µg/L	µg/L	µg/L	µg/L
DRPH	100	1,000		<1,000[b]	<1,000[b]	<1,000[b]		NA	<1,000[b]	NA	<200
GRPH	5	50		<50J[b]	<50J[b]	<50J[b]		NA	<100J[b]	<50J[b]	NA
RRPH (Approx.)	200	2,000		<2,000	<2,000	<2,000		NA	<2,000	NA	<2,000
BTEX (8020/8020 Mod.)											
Benzene	0.1	1	5	<1	<1	<1		<1[c]	<1	<1	<1
Toluene	0.1	1	1,000	<1	<1	<1		<1[c]	<1	<1	<1
Ethylbenzene	0.1	1	700	<1	<1	<1		<1[c]	<1	<1	<1
Xylenes (Total)	0.2	2	10,000	<2	<2	<2		<2[c]	<2	<2	<2
HVOC 8010	0.1	1		<1	<1	<1		NA	<1	<1	NA
VOC 8260											
1,2-Dichloroethane	1	1	5	<1-1.2	1.2	<1		<1	<1	<1	<1
SVOC 8270	10	10-25		<10-<25	<10J	<25		NA	NA	NA	<10
Pesticides	0.02-5	0.2-50		<0.2J-<50R	<0.2J-<50R	<0.2J-<50R		NA	<0.2J-<25R	NA	NA
PCBs	0.2	2	0.5	<2	<2	<2		NA	<2	NA	NA

- ☐ CT&E Data.
- ▩ F&B Data.
- NA Not analyzed.
- J Result is an estimate.
- R Result has been rejected.
- b DRPH and GRPH concentrations reported for these samples are equivalent to diesel and gasoline range organics (DRO and GRO) as defined by ADEC.
- c BTEX determined by 8260 method analysis.

TABLE 2-3. BACKGROUND ANALYTICAL DATA SUMMARY (CONTINUED)

Installation: Point Barrow
Site: Background (BKGD)
Matrix: Surface Water
Units: µg/L

Parameters	Detect. Limits	Quant. Limits	Action Levels	Bkgd. Range	Environmental Samples			Field Blanks			Lab Blanks
					SW01	SW02		AB01	EB01	TB01	
Laboratory Sample ID Numbers					778/780 4395-3	784/786 4394-1 4395-6		4395-2	1156-1158 4424-4	776 4395-1	4395 4394 4424
ANALYSES	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L		µg/L	µg/L	µg/L	µg/L
TOC	5,000	5,000		16,700-22,500	16,700	22,500		NA	NA	NA	<5,000
TSS	100	200		5,000-6,000	5,000	6,000		NA	NA	NA	<200
TDS	10,000	10,000		166,000J-213,000	166,000J	213,000		NA	NA	NA	<10,000

□ CT&E Data.
NA Not analyzed.
J Result is an estimate.

TABLE 2-3. BACKGROUND ANALYTICAL DATA SUMMARY (CONTINUED)

Installation: Point Barrow Matrix: Surface Water METALS ANALYSES: TOTAL (DISSOLVED)
Site: Background (BKGD) Units: µg/L

Parameters	Detect. Limits	Quant. Limits	Action Levels	Bkgd. Range from 7 DEW Line Installations	Bkgd. Range	Environmental Samples				Field Blank			Lab Blanks
						SW01	SW02				EB01		
Laboratory Sample ID Numbers						4395-3	4394-1				4424-4		4424 4394 4395
ANALYSES	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L				µg/L		µg/L
Aluminum	17.4	100		<100-350 (<100-340)	<100 (<100)	<100 (<100)	<100 (<100)				<100		<100 (<100)
Antimony	N/A	100	6	<100 (<100)	<100 (<100)	<100 (<100)	<100 (<100)				<100		<100 (<100)
Arsenic	5.3	100	50	<100 (<100)	<100 (<100)	<100 (<100)	<100 (<100)				<100		<100 (<100)
Barium	1.2	50	2,000	<50-93 (<50-91)	<50 (<50)	<50 (<50)	<50 (<50)				<50		<50 (<50)
Beryllium	N/A	50	4	<50 (<50)	<50 (<50)	<50 (<50)	<50 (<50)				<50		<50 (<50)
Cadmium	1.7	50	5	<50 (<50)	<50 (<50)	<50 (<50)	<50 (<50)				<50		<50 (<50)
Calcium	34.5	200		4,500-88,000 (4,100-86,000)	8,000-13,000 (8,500-14,000)	8,000 (8,500)	13,000 (14,000)				220		<200 (<200)
Chromium	3.29	50	100	<50 (<50)	<50 (<50)	<50 (<50)	<50 (<50)				<50		<50 (<50)
Cobalt	N/A	100		<100 (<100)	<100 (<100)	<100 (<100)	<100 (<100)				<50		<100 (<100)
Copper	2.3	50	1,300	<50 (<50)	<50 (<50)	<50 (<50)	<50 (<50)				<50		<50 (<50)
Iron	25	100		180-2,800 (<100-1,600)	180-250 (150-360)	180 (150)	250 (360)				<100		<100 (<100)
Lead	6.6	100	15	<100 (<100)	<100 (<100)	<100 (<100)	<100 (<100)				<100		<100 (<100)

☐ CT&E Data.
N/A Not available.

TABLE 2-3. BACKGROUND ANALYTICAL DATA SUMMARY (CONTINUED)

Installation: Point Barrow Matrix: Surface Water METALS ANALYSES: TOTAL
Site: Background (BKGD) Units: µg/L (DISSOLVED)

Parameters	Detect. Limits	Quant. Limits	Action Levels	Bkgd. Range from 7 DEW Line Installations	Bkgd. Range	Environmental Samples				Field Blank			Lab Blanks
						SW01	SW02				EB01		
Laboratory Sample ID Numbers						4395-3	4394-1				4424-4		4424 4394 4395
ANALYSES	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L				µg/L		µg/L
Magnesium	47.8	200		2,900-53,000 (2,600-54,000)	10,000-14,000 (10,000-14,000)	10,000 (10,000)	14,000 (14,000)				<200		<200 (<200)
Manganese	1.24	50		<50-510 (<50-120)	<50 (<50)	<50 (<50)	<50 (<50)				<50		<50 (<50)
Molybdenum	N/A	50		<50 (<50)	<50 (<50)	<50 (<50)	<50 (<50)				<50		<50 (<50)
Nickel	5.5	50	100	<50 (<50)	<50 (<50)	<50 (<50)	<50 (<50)				<50		<50 (<50)
Potassium	1,154	5,000		<5,000 (<5,000)	<5,000 (<5,000)	<5,000 (<5,000)	<5,000 (<5,000)				<5,000		<5,000 (<5,000)
Selenium	62.4	100	50	<100 (<100)	<100 (<100)	<100 (<100)	<100 (<100)				<100		<100 (<100)
Silver	2.6	50	50	<50 (<50)	<50 (<50)	<50 (<50)	<50 (<50)				<50		<50 (<50)
Sodium	27.7	250		8,400-410,000 (8,200-450,000)	39,000J-49,000 (39,000J-46,000)	39,000J (39,000J)	49,000 (46,000)				<250		<250 (<250)
Thallium	0.57	5	2	<5 (<5)	<5 (<5)	<5 (<5)	<5 (<5)				<5		<5 (<5)
Vanadium	1.8	50		<50 (<50)	<50 (<50)	<50 (<50)	<50 (<50)				<50		<50 (<50)
Zinc	8.2	50		<50-160 (<50)	<50-73 (<50)	<50 (<50)	73 (<50)				<50		<50 (<50)

☐ CT&E Data.
N/A Not available.
J Result is an estimate.

2.3.3 Laboratory Analyses

This section describes the RI analytical program. Summaries of the soil/sediment and surface water analyses conducted during the RI are presented in Tables 2-4 and 2-5. Table 2-4 presents a description of the soil analytical methods and number of soil samples collected, and Table 2-5 presents a description of the water analytical methods and the number of surface water samples collected during the RI.

2.3.3.1 Analytical Program. Analyses of samples were conducted by a fixed laboratory in Anchorage, Alaska, and a temporary laboratory set up at Barrow, Alaska. The analytical testing conducted by each laboratory is discussed below.

The fixed laboratory in Anchorage, Alaska, was operated by Commercial Testing & Engineering (CT&E). CT&E analyzed samples as follows:

Analyses	Analytical Method
Volatile Organic Compounds	SW5030/8260
Metals	SW3050 (Soil) 3005 (Water)/6010
Semi-Volatile Organic Compounds	SW3550 (Soil) 3510 (Water)/8270
Total Dissolved Solids	E160.1
Total Suspended Solids	E160.5
Total Organic Carbon	SW9060
Moisture Content	ASTM D 2216
Toxicity Characteristic Leaching Procedure (TCLP)	SW1311

In addition, for the first few weeks of the field activities, CT&E provided the following analyses on a quick turnaround basis:

Analyses	Analytical Method
Halogenated Volatile Organic Compounds	SW5030/8010
Benzene, Toluene, Ethylbenzene, and Xylene	SW5030/8020
Gasoline Range Petroleum Hydrocarbons	8015 Modified
Diesel Range Petroleum Hydrocarbons	8100 Modified
Polychlorinated Biphenyls/Pesticides	SW5030/8080

The temporary laboratory in Barrow, Alaska, was operated by Friedman & Bruya (F&B) of Seattle. F&B analyzed samples for the following constituents:

Analyses	Analytical Method
Halogenated Volatile Organic Compounds (four compounds only)	SW5030/8010 Modified
Benzene, Toluene, Ethylbenzene, and Xylenes	SW5030/8020 Modified
Polychlorinated Biphenyls/Pesticides	SW3550/8080 Modified
Diesel Range Organics (DRO)	8100 Modified
Gasoline Range Organics (GRO)	8010/8020/8015 Modified
Residual Range Organics	8100 Modified

TABLE 2-4. ANALYTICAL METHODS AND TOTAL NUMBER OF SOIL ANALYSES

SOIL ANALYSES	ANALYTICAL METHOD	REPORTING UNITS	NUMBER OF ANALYSES[a]	REPLICATES	TOTAL ANALYSES
Volatile Organics	SW5030/8260	mg/kg	8	1	9
Semi-Volatile Organics	SW3550/8270	mg/kg	10	1	11
Total Metals Analysis --ICP Screen	SW3050/6010	mg/kg	8	1	9
TOC, Soil	SW9060	mg/kg	5	1	6
TPH - Diesel Range	SW3510/3550/8100M	mg/kg	50	5	55
TPH - Gasoline Range	SW5030/8015M	mg/kg	40	5	45
TPH - Residual Oil	SW3510/3550/8100M	mg/kg	34	4	38
BTEX	SW5030/8020/8020M	mg/kg	36	4	40
Halogenated Volatile Organic Compounds	SW5030/8010M	mg/kg	22	3	25
PCB	SW5030/8080/8080M	mg/kg	17	2	19
Pesticides	SW5030/8080/8080M	mg/kg	9	1	10
TOTAL SOIL ANALYSES			239	28	267
TOTAL SOIL SAMPLES			50	5	55

M Modified.
a Includes soil and sediment analyses.

TABLE 2-5. ANALYTICAL METHODS AND TOTAL NUMBER OF WATER ANALYSES

WATER ANALYSES	ANALYTICAL METHOD	REPORTING UNITS	NUMBER OF ANALYSES	TRIP BLANKS	AMBIENT CONDITION BLANKS	EQUIPMENT BLANKS	DUPLICATES	TOTAL ANALYSES
Volatile Organics	SW5030/8260	µg/L	5	4	1	2	1	13
Semi-Volatile Organics	SW3550/8270	µg/L	4	0	0	0	1	5
Total Metals Analysis --ICP Screen	SW3005/6010	µg/L	4	0	0	1	1	6
Dissolved Metals Analysis --ICP Screen	SW3005/6010	µg/L	4	0	0	0	1	5
TOC, Nonpurgable	SW9060	µg/L	5	0	0	0	1	6
Residue, Filterable (TSS)	E 160.2	µg/L	5	0	0	0	1	6
Residue, Filterable (TDS)	E 160.1	µg/L	5	0	0	0	1	6
TPH - Diesel Range	SW3510/3550/8100M	µg/L	16	0	0	1	2	19
TPH - Gasoline Range	SW5030/8015M	µg/L	16	2	0	2	2	22
TPH - Residual Oil	SW3510/3550/8100M	µg/L	16	0	0	1	2	19
BTEX	SW5030/8020/8020M	µg/L	16	2	0	1	2	21
Halogenated Volatile Organic Compounds	SW5030/8010M	µg/L	9	2	0	1	1	13
PCB	SW5030/8080/8080M	µg/L	9	0	0	1	1	11
Pesticides	SW5030/8080/8080M	µg/L	2	0	0	1	0	3
TCLP	SW1311	µg/L	1	0	0	0	0	1
TOTAL WATER ANALYSES			117	10	1	11	17	156
TOTAL WATER SAMPLES			17	4	1	2	2	26

Analytical methods used during sample analyses for this project are summarized in Tables 2-4 and 2-5 and are developed from the reference methods described in the following sources:

- *Test Methods for Evaluating Solid Waste (Physical/Chemical Methods)* Third Edition, EPA SW-846. September 1986.
- *Methods for Chemical Analysis of Water and Wastes*, EPA-600/4-79-020. March 1983.
- *Standard Methods for the Examination of Water and Wastewater*, APHA/AWWA, 17th Edition. 1989.
- *Interim Guidance for Non-UST Soil Cleanup Levels*, Alaska Department of Environmental Conservation, July 1991.

Project-specific analytical methods and procedures, target analytes, quantitation limits, and acceptance criteria are presented in the RI/FS SAP (U.S. Air Force 1993b).

2.3.4 Chronology of Laboratory Analyses

Laboratory analyses conducted by the temporary laboratory, F&B, in Barrow, Alaska, were conducted on a quick-turnaround basis. The samples collected at Point Barrow radar installation were analyzed by this laboratory during the period from 26 August to 11 September 1993.

Analyses at the CT&E laboratory in Anchorage, Alaska, were conducted between 26 August and 15 October 1993. These analyses included a few quick-turnaround analyses and primarily standard-turnaround analyses.

2.3.5 Laboratory QA/QC Programs

The quality assurance (QA) objectives for this project were achieved through implementation of specific procedures for sampling, chain-of-custody, calibration, laboratory analyses, data validation and reporting, internal QC, audits, preventive maintenance, and corrective actions.

A detailed description of QA/QC measures, frequency, and corrective actions used by both labs is presented in the Quality Assurance Project Plan (QAPjP) [Section 1.0 of the RI/FS SAP (U.S. Air Force 1993b)]. Ultimately, the relevant laboratory standard operating procedures (SOPs) provide full and detailed guidance regarding all method-specific laboratory QA/QC criteria and appropriate corrective actions.

Data quality for the organic analyses was monitored by the laboratory through a QA program that included analyses of initial and continuing calibrations, method blanks, surrogate spikes, internal standards, matrix spikes, matrix spike duplicates, and laboratory control samples. The identification of target analytes at levels above the detection limit were confirmed by gas chromatography/mass spectrometry (GC/MS) or analysis on a gas chromatograph (GC) equipped with a different column (second column confirmation).

Data quality for the inorganic analyses was monitored through a QC program that included analyses of initial and continuing calibrations, laboratory control samples, method blanks, duplicate samples, post-digestion analytical spikes, and matrix spikes.

Laboratory QC samples were analyzed at a rate of at least one per 20 determinations. See the RI/FS QAPjP for laboratory specific criteria for the frequency of QC sample analyses and corrective actions regarding QC analyses.

2.3.6 Data Validation and Reporting

Data validation is a systematic process of reviewing a group of sample data to provide assurance that the data are adequate for their intended use. The validation activities were performed in accordance with the following EPA documents to the extent that they were applicable:

- *Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses*. EPA. Hazardous Site Evaluation Division. December 1990.

- *Laboratory Data Validation Guidelines for Evaluating Inorganic Analyses*. EPA. Hazardous Site Evaluation Division. October 1989a.

- *Test Methods for Evaluating Solid Waste (Physical/Chemical Methods)* Third Edition, EPA SW-846. September 1986.

Prior to releasing data for use by project staff, selected data packages underwent a formal validation procedure to examine laboratory compliance with QA requirements and other factors that determine the quality of the data. The organic validation was performed by the prime contractor in accordance with the EPA Functional Guidelines for Evaluating Organic Analyses. The following factors were examined:

- Sample holding times;
- Sample chain-of-custody;
- GC/MS tuning criteria;
- Initial and continuing calibration;
- Method blanks;
- Practical quantitation limits;
- Laboratory blank contamination;
- Surrogate spike recoveries;
- Matrix spike/duplicate analysis;
- Field duplicate analysis;
- Ambient condition blank contamination;
- Trip blank contamination;
- Internal standard area;
- Pesticide instrument performance;
- Compound identification criteria; and
- Analyte identification and quantitation.

The inorganic data validation was performed in accordance with the EPA Functional Guidelines for Evaluating Inorganic Analyses. Parameters evaluated include:

- Holding time;
- Blank results;
- Instrument calibration;
- Inductively Coupled Plasma (ICP) Spectroscopy interference check analysis;
- Laboratory Control Samples;
- Duplicate analysis;
- Spike analyses;
- Furnace analyses (spikes and duplicates);
- Serial dilution;
- Detection limits; and
- Analyte quantitation.

When a data package was received from the laboratory, the analytical results and associated QA/QC documentation were reviewed for technical compliance, and data validation reports were prepared summarizing the QA/QC parameters that were reviewed. The review included evaluation of laboratory and field blank sample data, and review of all data for accuracy, precision, and completeness.

A cross-section of CT&E analytical data, representing approximately 15 percent of all the CT&E analyses, underwent formal data validation. Because some reporting errors were found in the F&B analytical data, 100 percent of the F&B data was validated. Once the validation for a batch of samples was completed, a validation report was prepared. The report highlights all the QC criteria evaluated, and notes any major deficiencies or QA problems. Although a minimal amount of analytical data was rejected during data evaluation, the acceptable and valid data from CT&E and F&B are sufficient to meet the project objectives. The data validation reports for data generated by CT&E and F&B are presented in Appendix G.

2.4 METHODOLOGY FOR RISK ESTIMATION

This section describes the methods used to determine the potential risks to human and ecological receptors from chemicals detected in samples collected from the three sites at the installation. A summary of the risks posed by chemicals detected at each of the sites is presented on a site-by-site basis in Sections 3.0 through 5.0. The complete human health and ecological risk assessments (ERA) are presented in the Point Barrow Risk Assessment (U.S. Air Force 1996), which has been submitted under separate cover.

In addition to the methods for risk evaluation, this section presents contaminant fate and transport, general potential migration pathways, and receptor groups common to all of the Point Barrow sites.

2.4.1 Human Health Risk

The evaluation of human health risk was conducted in accordance with standard risk assessment methodology as described in *Risk Assessment Guidance for Superfund (RAGS): Human Health Evaluation Manual, Part A* (EPA 1989b), *Region 10 Supplemental Risk Assessment Guidance for Superfund* (EPA 1991a), and the *Handbook to Support the Installation Restoration Program Statements of Work* (U.S. Air Force 1991). This section presents a summary of the approach used in evaluating the human health risks associated with the sites at the Point Barrow radar installation.

The Point Barrow DEW Line installation presented a unique challenge to the development of a human health risk assessment. Many of the conventional assumptions applied to risk assessments do not apply to the North Slope of Alaska. Point Barrow is remote and sparsely populated. Native residents from surrounding areas, largely Inupiats, follow a lifestyle that includes a significant subsistence component; much of their food is the mammals (whales, seals, and caribou), aquatic life (arctic char), and birds (ptarmigan and ducks) that are abundant in this area of the arctic. The climate is generally harsh, and the soil and surface water are frozen for approximately nine months of the year. The following paragraphs present some of the approaches and assumptions used in the development of the human health risk assessment.

The general approach to the human health risk assessment was to quantify the excess lifetime cancer risk and the noncancer hazard associated with exposure to the site contaminants detected at each of the three sites at the installation. The maximum concentration of each chemical detected was used as the exposure point concentration instead of an arithmetic mean or 95th percentile upper confidence limit (UCL) because contamination was infrequently detected and found to be generally of low concentration. Incorporating nondetects into the calculation of an average or UCL when the frequency of positive detects is low tends to yield low and unreliable estimates of contamination. Use of the maximum concentration yields a more conservative estimate of risk or hazard.

Chemical concentrations detected in soil, sediment, or surface water samples from each of the sites were compared to risk-based screening levels (RBSLs), ARARS, and background concentrations. A chemical was selected as a COC if the maximum concentration at which the chemical was detected exceeded the corresponding background concentration and the RBSL (based either on cancer risk or noncancer hazard) or an ARAR. COCs selected in this manner were evaluated in the human health risk assessment.

An exposure pathway describes the course a chemical will take from a source to an exposure point where a receptor can come into contact with the chemical. The exposure pathways by which exposure to the COCs at Point Barrow may occur include ingestion, dermal contact, and inhalation. The dermal contact and inhalation pathways were not considered complete or significant because the arctic climate precludes dermal contact with and volatilization of site contaminants, so they were not evaluated. Exposure pathways that were considered for all sites were incidental ingestion of soil/sediment and ingestion of surface water.

Three potential receptor groups were evaluated in the risk assessment: an adult assigned to a DEW Line installation (worker), an adult inhabitant of a community on the North Slope of Alaska (native), and a child living in a North Slope community (child).

The risk assessment assumed a residential scenario when estimating the soil/sediment and water ingestion rates. The soil/sediment ingestion rate was based on EPA default values, 100 mg/day for adults and 200 mg/day for children. The drinking water ingestion rate assumed the surface water where chemicals were detected at the site will be used as a source of drinking water for 180 days per year at the EPA default ingestion rate of 2 liters per day.

The exposure duration assumed a DEW Line worker would be stationed at the Point Barrow installation for 10 years. The exposure duration for the native was estimated to be 55 years. EPA's default reasonable maximum exposure duration is 30 years; however, this is based on the residence time in one location for the continental United States. Because Alaskan natives are more likely to remain in North Slope communities for a longer period, 55 years was determined to be a more appropriate estimate of residence time.

The risk assessment was based on the assumptions just described , along with chemical-specific toxicity data, to quantitatively and qualitatively express the hazards and risks. To characterize potential noncancerous effects, comparisons were made between projected intakes of the COCS and chemical-specific toxicity values. The potential noncancerous health effects were expressed as a hazard quotient (HQ). To assess the overall potential for noncancerous effects posed by more than one chemical at a site, the HQs were summed and reported as the hazard index. An HQ or hazard index of 1.0 is the regulatory benchmark. Noncancer hazards greater than 1.0 are generally considered a concern, and noncancer hazards of less than 1.0 are generally considered to not warrant further evaluation.

To characterize the potential for carcinogenic effects, the probability that an individual will develop cancer over a lifetime of exposure, the risks were estimated from projected intakes of the COCs and chemical-specific dose-response information. The cancer risks are calculated on a chemical-specific basis and are added together (if more than one chemical associated with cancer risk is a COC at the site) to estimate the total cancer risk for the site. The total cancer risk for each pathway is generally not considered to be of concern unless it exceeds a value of 1×10^{-6} (EPA 1991b).

Excess lifetime cancer risk is the incremental increase in the probability of developing cancer during one's lifetime over and above the background probability of developing cancer (i.e., if no exposure to site chemicals occurs). For example, a 1×10^{-6} excess lifetime cancer risk means that, in a population of one million people exposed to the carcinogen throughout their lifetimes, the average incidence of cancer may increase by one case. The background probability among Americans of developing cancer at some time in their lives is about one in four (American Cancer Society 1993). The calculation of cancer risks uses information (i.e., cancer slope factors) developed by the EPA that represents upper bound estimates, so any cancer risks estimated in the risk assessment should be regarded as upper bounds on the potential cancer risks rather than accurate representations of true cancer risk. The true cancer risk is likely to be lower than that predicted (EPA 1989a).

Excess lifetime cancer risk and noncancer hazard were calculated for the soil/sediment ingestion and water ingestion pathways. Other pathways were eliminated from consideration as described in the Point Barrow Risk Assessment (U.S. Air Force 1996). The risks and hazards associated with chemicals detected at the Point Barrow sites are presented on a site-by-site basis in Sections 3.0 through 5.0 of this RI/FS report.

2.4.2 Ecological Risk

The objective of the ERA was to estimate potential impacts to aquatic and terrestrial plants and animals at the Point Barrow DEW Line installation. The evaluation of environmental risks was conducted in accordance with current Air Force and EPA guidance, specifically, *Handbook to Support the Installation Restoration Program Statements of Work* (U.S. Air Force 1991), *Framework for Ecological Risk Assessment* (EPA 1992), and *Ecological Risk Assessment Guidance for Superfund* (EPA 1994).

The approach used to assess potential ecological impacts was conceptually similar to that used to assess human health risks. Potentially exposed populations (receptors) were identified, and information on exposure and toxicity was combined to derive estimates of risk. However, the scope of ERAs is generally different from that of human health risk assessments in that ecological assessment focuses on potential impacts to populations of organisms rather than to individual organisms (except in the case of endangered species where individuals are considered). In addition, because ecosystems are composed of a variety of species, ecological assessments evaluate potential impacts to numerous species instead of a single species (as is the case in human health assessments).

Ideally, ERAs should evaluate potential risks to communities and ecosystems, as well as to individual populations. However, because of the large number of species and communities present in natural systems, such ecosystem-wide assessments are very complex and appropriate assessment methodologies have not yet been developed. In addition, dose-response data on community or ecosystem responses are generally lacking. Therefore, evaluations of potential impacts to communities or ecosystems are qualitative.

The degree to which potential ecological impacts can be characterized is highly dependent upon the data available to support such estimates. Data required include: information regarding contaminant release, transport, and fate; characteristics of potential receptor populations; and adequate supporting toxicity data for the COCs. The degree to which the existing database can meet these requirements dictates the extent to which potential ecological impacts can be evaluated.

Ecological receptors can be exposed to COCs through abiotic and biotic media. Potential exposure pathways for terrestrial and aquatic organisms include direct contact and ingestion of contaminated soil/sediment and/or surface water. The most significant route of exposure for plants is direct contact with soil. Aquatic organisms such as fish and invertebrates are primarily exposed through direct contact with surface water, but may be exposed to COCs through ingestion of plant and animal items in the diet, and incidental ingestion of soil/sediment while foraging (only direct contact with surface water is used to develop risk estimates). Birds and

mammals may be exposed to COCs through ingestion of surface water, ingestion of plant and animal diet items, and incidental ingestion of soil/sediment.

The potential ecological receptors evaluated in the risk assessment include plants, aquatic organisms, birds, and mammals likely to occur along the Arctic Coastal Plain. Representative species from these groups of receptors were selected based primarily on the species' likelihood of exposure given their preferred habitat and feeding habits. Species that may be particularly sensitive to environmental impacts, such as endangered or threatened species, were also evaluated. The representative species are presented in Table 2-6. Any threatened or endangered species evaluated in the ERA are not considered representative of the Arctic Coastal Plain or the DEW Line installations. These species are evaluated to provide information about whether they face potential risks from exposure to COCs.

Potential risks to representative species were estimated by evaluating sampling data for the relevant exposure media (i.e., soil/sediment and surface water). Potential risks to plants were evaluated by comparing the average contaminant concentrations in the site soil/sediment to toxicity information in the literature. Potential impacts on aquatic receptors were evaluated by comparing average surface water concentrations to toxicity reference values (TRVs). Potential impacts to birds and mammals were evaluated for selected representative species by comparisons of estimated exposures, based on potential dietary intakes of COCs, to TRVs. TRVs for representative species are derived by selecting toxicity values from the literature and extrapolating to the species of concern. TRVs are then divided into the estimated exposure concentration to derive the HQ. If the HQ is less than one, then adverse effects are not expected. Conversely, if the HQ is equal to or greater than one a potential for adverse effects exists. The confidence level of the risk estimate is increased as the magnitude of the HQ departs from 1.0. For example, there is greater confidence in a risk estimate where the HQ is 0.1 or 10, than in an HQ such as 0.9 to 1.1.

TRVs are calculated to be protective for long-term exposures. This is accomplished by using chronic chemical and receptor-specific no-effect dosages as starting points when such data is available. If chronic or receptor-specific data is not available, then uncertainty and scaling factors (to account for differences in body size) are incorporated in the derivation of the TRVs. This is standard practice in ERAs and is illustrated in screening level benchmarks used in the ERA for sediments (Hull and Suter 1994), aquatic biota (Suter and Mabrey 1994), and wildlife (Opresko et al. 1994). The assumptions incorporated in the ERA assume daily exposure during the receptor's most sensitive life stage (i.e., one breeding season). Consequently, if no risks are identified at the "chronic" level, there will be no risk related to "acute", or occasional exposures. This should be kept in mind when interpreting the HQ. Although the HQ may be greater than one, the conservatism embodied in the TRV, and assumptions of the ERA, allow for mitigating factors (e.g., large home range, short seasonal exposure, unlikely repeated exposures at a "hot spot" location) that may result in a finding of no significant risk.

TABLE 2-6. REPRESENTATIVE SPECIES AT THE DEW LINE INSTALLATION SITES

COMMON NAME	GENUS AND SPECIES
Sedge	*Carex* spp.
Cottongrass	*Eriophorum* spp.
Willow	*Salix* spp.
Berries	*Vaccinium* spp.
Water fleas	*Daphnia* spp.
Nine-spined stickleback	*Pungitius pungitius*
Arctic char	*Salvelinus alpinus*
Lapland longspur	*Calcarius lapponicus*
Brant	*Branta bernicla*
Glaucous gull	*Larus hyperboreus*
Pectoral sandpiper	*Calidris melanotos*
Brown lemming	*Lemmus trimucronatus*
Arctic fox	*Alopex lagopus*
Barren-ground caribou	*Rangifer tarandus*
Spectacled eider[a]	*Somateria fischeri*
Steller's eider[b]	*Polysticta stelleri*

a threatened status
b candidate for threatened status

The ERA was intended to be at a screening level, rather than a full scale investigation of the state of the ecosystem. No specific onsite studies of the biota were undertaken. The assessment was based on media sampling (i.e., surface water and soil/sediment samples). The ecological risks associated with the chemicals detected at the Point Barrow sites are presented site-by-site in Sections 3.0 through 5.0 of this RI/FS report. The complete ERA is presented in the Section 3.0 of the Final Point Barrow Risk Assessment (U.S. Air Force 1996).

2.4.3 Contaminant Fate and Transport

The fate and transport of the COCs in soil/sediment, active layer water, and surface water have been accounted for in the sampling plan. Known source areas were sampled, and the extent of migration was evaluated by sampling at increasing distances from the source area. Surface and

subsurface sampling was conducted in gravel pads and tundra areas to characterize the extent of contaminant migration. Water samples were collected in boreholes, streams, and ponds and analyzed to evaluate the migration of contamination from source areas to water bodies potentially used by human or ecological receptors. The potential for contaminant migration is discussed on a site-specific basis in Sections 3.0 through 5.0.

2.4.4 General Migration Pathways

This section presents general information concerning migration pathways for the three sites at the Point Barrow radar installation. Site-specific migration pathways are discussed in Sections 3.0 through 5.0.

The potential for contaminant migration exists for any site where a release has occurred. The threat that a contaminated site presents to human health or the environment was assessed according to the potential for contaminant migration, human or ecological receptors, and contaminant concentrations to which the receptors may be exposed.

There are three main pathways through which contaminants may reach human and ecological receptors. These pathways are subsurface migration (in affected active layer water), surface migration, and air transportation (as vapors or dust). Potential migration pathways are depicted in Figure 2-3. Figures 2-4 and 2-5 present the potential exposure pathways for the human and ecological receptors, respectively. The discussion of migration pathways is preceded by a general description of the topography and stratigraphy at Point Barrow.

2.4.4.1 Topography. The Point Barrow installation is located between two large bodies of water (the North Salt Lagoon and Imikpuk Lake). Drainage at the installation is poorly developed and consists of small drainage features that connect larger puddles, tundra ponds, and marshy areas; most areas at the site drain generally toward the North Salt Lagoon. Imikpuk Lake contains fresh (non-saline) water and is used as a drinking water source for facilities at the former Naval Arctic Research Laboratory.

Little topographic relief is expressed at the Point Barrow installation; the maximum elevation is approximately eight feet above MSL. The tundra surface is flat or very slightly sloping. Gravel pads and roads, which are of human origin, rise approximately four to five feet above the tundra. The edges of these features are sloped at the angle of repose for unconsolidated sands and gravels.

South of the main station facilities, the most prominent natural topographic features, visible from the air and ground surface, are ice wedge polygons. These features are formed by cracking of the ground surface during thermal contraction, followed by the infiltration of water. The water then freezes and forces the crack wider. Repeated freeze-thaw cycles enlarge these features, which form small troughs and may fill with water. Intersecting troughs form polygonal arrangements, that range from a couple feet to tens of feet across.

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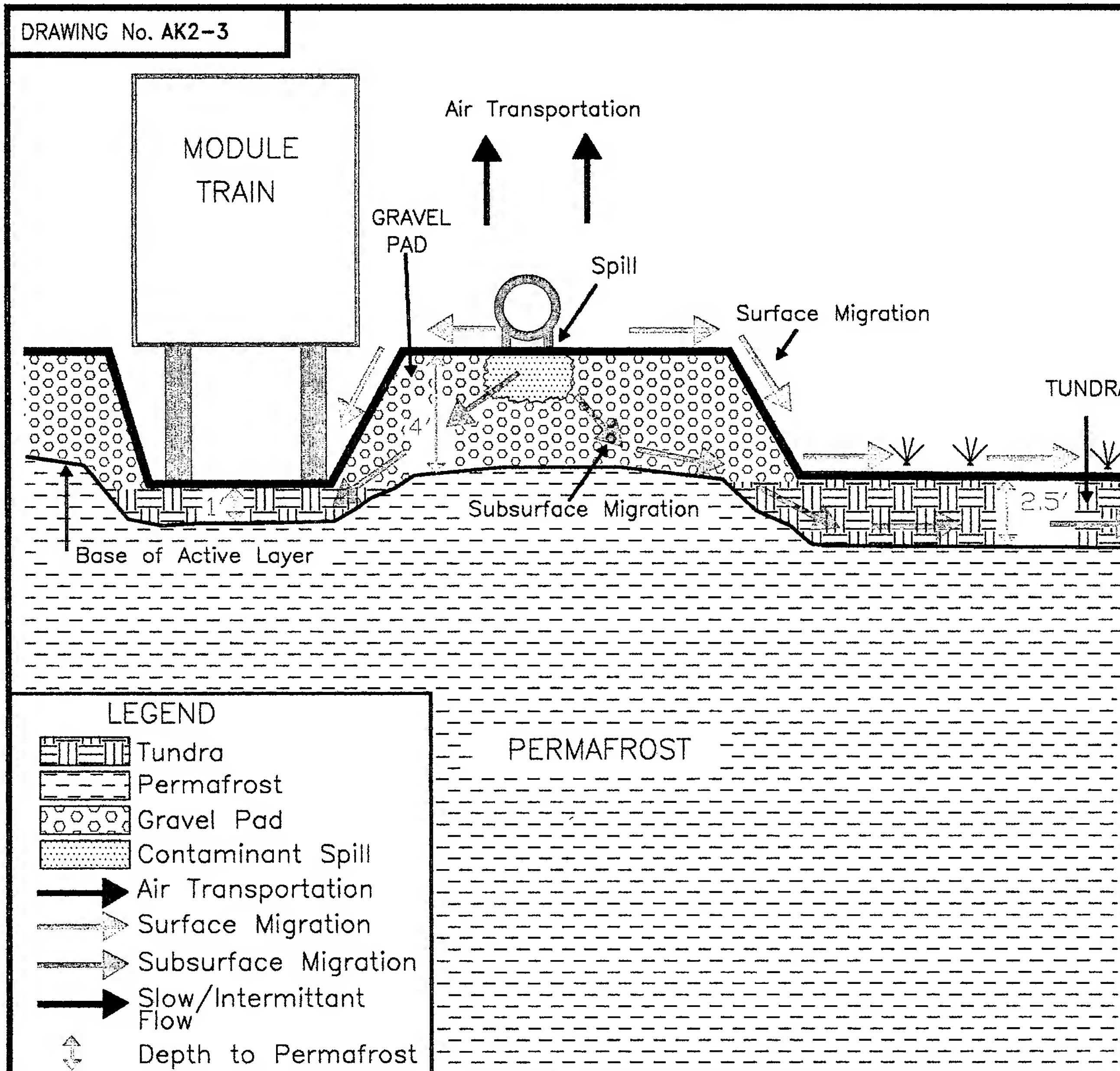

ALASKA REMOTE RADAR INSTALLATIONS

USAF 611th CES

FIGURE NO. 2-3

POTENTIAL MIGRATION PATHWAYS

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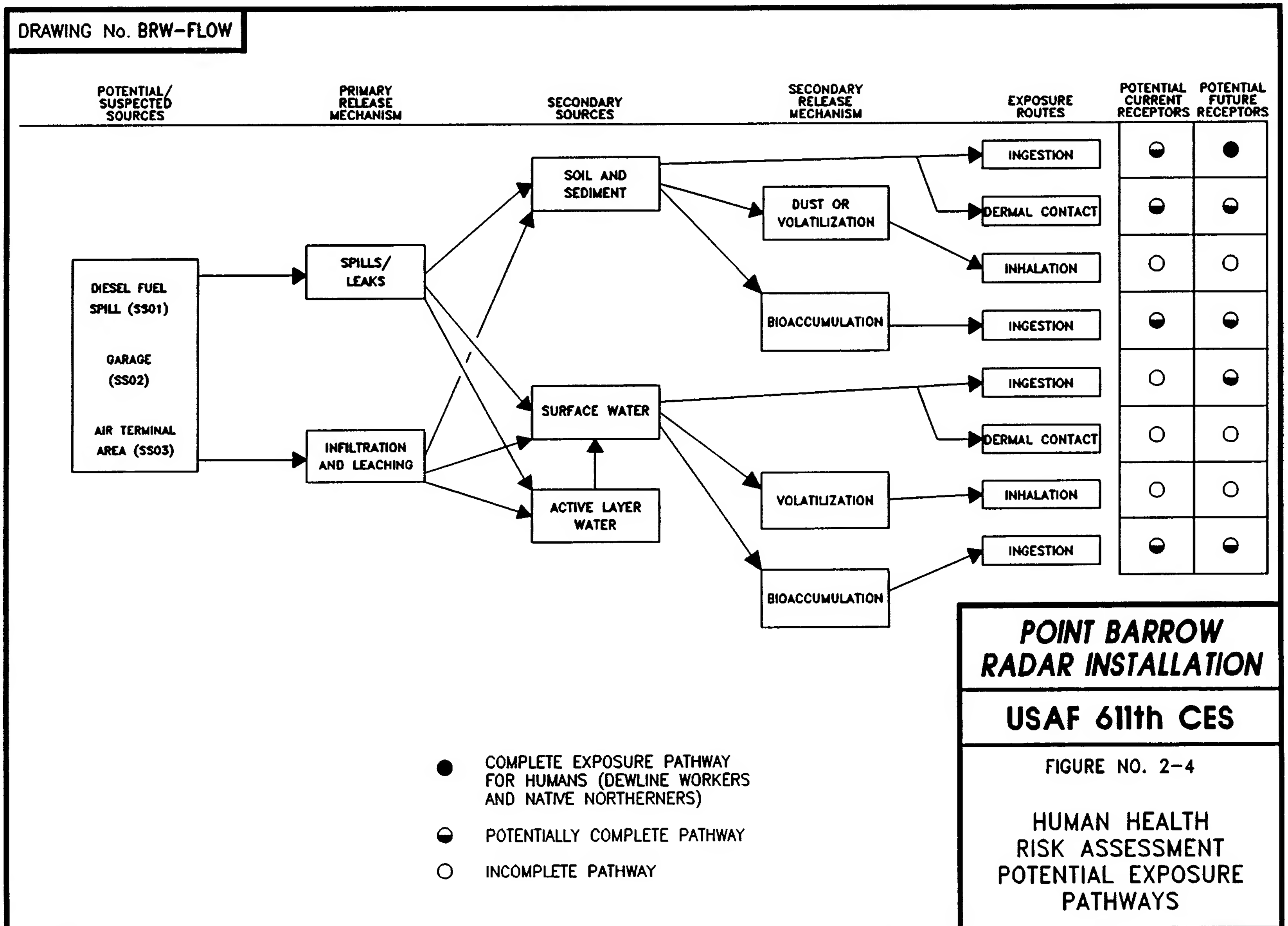

FIGURE NO. 2-4

HUMAN HEALTH RISK ASSESSMENT POTENTIAL EXPOSURE PATHWAYS

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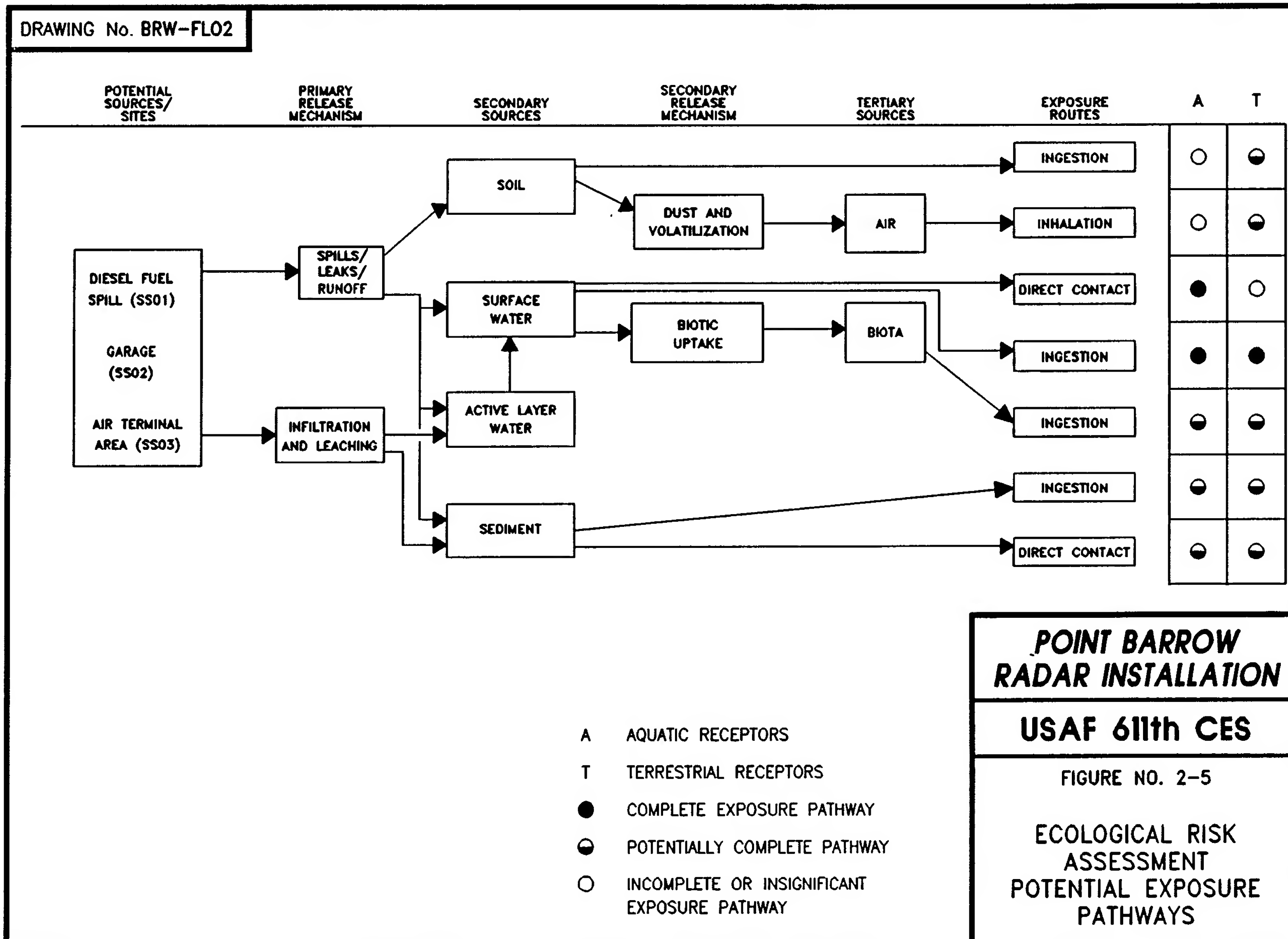

POINT BARROW RADAR INSTALLATION

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FIGURE NO. 2-5

ECOLOGICAL RISK ASSESSMENT POTENTIAL EXPOSURE PATHWAYS

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Two types of ice wedge polygons exist: low centered and high centered. In low centered polygons, the middle of the polygon is depressed to form a small basin, which may fill with water. A cross-section of one of these basins would reveal an ice-wedge trough on either side of the polygon, berms lining both sides of the troughs, and a basin filling the interior space between the berms. A high centered polygon does not have a depressed center, and consists of intersecting troughs with higher ground in the middle.

Another prominent tundra feature consists of oriented lakes. These lakes, which form from low centered polygons, are enlarged by the erosional action of wind-induced waves. These lakes are not circular but oblong, with the long axis of the lake normal to the prevailing wind direction. They can "migrate" across the tundra at an average rate of three feet per year (Livingstone 1954) and have a stable depth of approximately 10 feet (Hussey and Michaelson 1966).

2.4.4.2 Stratigraphy. The stratigraphy at Point Barrow was examined during RI activities down to the level of the permafrost (generally no deeper than two to four feet during August and September 1993). The upper-most features at the site are gravel roads and pads of human origin. These features, which are limited in areal extent, have a maximum height of approximately six feet. They generally consist of well-graded sandy gravels with sub-angular to sub-rounded, very fine to coarse sands and sub-angular to sub-rounded gravel clasts ranging from one-quarter inch to one and one-half inches (although gravel clasts ranging up to four inches or more are occasionally encountered). The grains are unconsolidated, and fine material (silts or clays) may be present in minor quantities.

Gravel pads and roads were constructed on top of native tundra, which occurs throughout the site. The top of the tundra consists of a vegetative mat in a loamy/silty matrix. This mat can reach several inches in thickness. Underlying the tundra mat are fine to coarse sands and gravels, dark brown organic clays, and silt layers. The depth to permafrost beneath the tundra was approximately two feet during the 1993 RI. Adjacent to the North Salt Lagoon, Imikpuk Lake, and Beaufort Sea, beaches may be present that consist of poor to well sorted sub-rounded to rounded, fine to coarse sands, and sub-rounded to rounded gravel clasts (of varying size; minor amounts of fine material are also present.

2.4.4.3 Subsurface Migration. Active layer water flow under the tundra is hampered by the presence of numerous wet depressions and the relatively flat topography; because the depth to permafrost under these depressions is increased, they tend to act as small catchment basins. These basins limit the potential for the horizontal flow of active layer water (Miller et al. 1980; Robertson 1988). The active layer water flow in these areas is so inhibited that it can contribute little to the midsummer water budget of tundra streams. Most of the active layer water contribution to these streams is from immediately adjacent well-drained slopes (Robertson 1988).

Some generalizations about active layer water flow can be made. Due to the combined effects of low topographic relief and the presence of numerous catchment basins, active layer water migration through areas of tundra is a slow process. The active layer water contribution to tundra streams is mainly from well-drained slopes next to those streams. The active layer water flow that does occur is governed by changes in topographic relief and is limited to spring and summer months, with the active layer functioning as a shallow, unconfined aquifer. The water

table in such an aquifer tends to mimic topographic features, and active layer water flow is driven by elevation changes. Figure 2-6 illustrates how the elevation changes of gravel roads and berms can restrict active layer water flow.

2.4.4.4 Surface Migration. Surface migration at the Point Barrow installation occurs as a result of the flow of surface water from topographic highs to topographic lows. Surface water flow during the spring thaw, when mounds of snow can channel drainage in unexpected directions, can be markedly different from flow during the summer months. The general surface migration features and directions are depicted in Figure 1-8.

The main factors controlling surface water flow are the topography and water availability. The topography at the Point Barrow installation has very little relief; therefore, there is only a small gradient to drive surface water flow. Combined with the depressions formed by the ice wedge polygons and gravel roads and berms, this creates a multibasinal drainage pattern in which much of the surface water is directed into depressions and small tundra ponds, rather than directly into drainage channels. Gravel pads provide the greatest topographic relief at the installation. Surface migration is generally radial out from the gravel pads.

Based upon precipitation alone, Point Barrow could classify as a desert (Robertson 1988). Precipitation along the Beaufort Sea coast averages only seven inches per year (Dingman et al. 1980; Walker et al. 1980). Additionally, 65 percent of the precipitation on the North Slope is in the form of snow (Walker et al. 1980). Most surface water flow occurs during the spring, when melting snow and ice release stored water over a relatively short time-frame and the active layer remains partially frozen. This creates a situation in which there is a large supply of surface water and very little capacity for infiltration. The result is the overland sheet flow (Robertson 1988), during which drainage is not confined to local drainage features but may travel in a sheet-like fashion over the topography. Snow, ice, and man-made features (gravel pads and roads) may also result in barriers that force the flow of surface water in directions different from those dictated by the underlying ground surface.

There is comparatively little flow of surface water during the summer. In fact, arctic wetlands exist because the lack of significant vertical relief retards the horizontal flow of surface water, and permafrost limits downward flow (Robertson 1988). Overflow from tundra ponds is generally dependant upon summer rainfall.

The potential for contaminant migration in surface water is, therefore, greatest during the spring thaw, which is of relatively short duration, during which the precise direction of flow may be difficult to determine.

There are no distinct streams at the Point Barrow installation. Tundra ponds and puddles drain into Imikpuk Lake and North Salt Lagoon via indistinct marshy drainages or by infiltration into the active layer.

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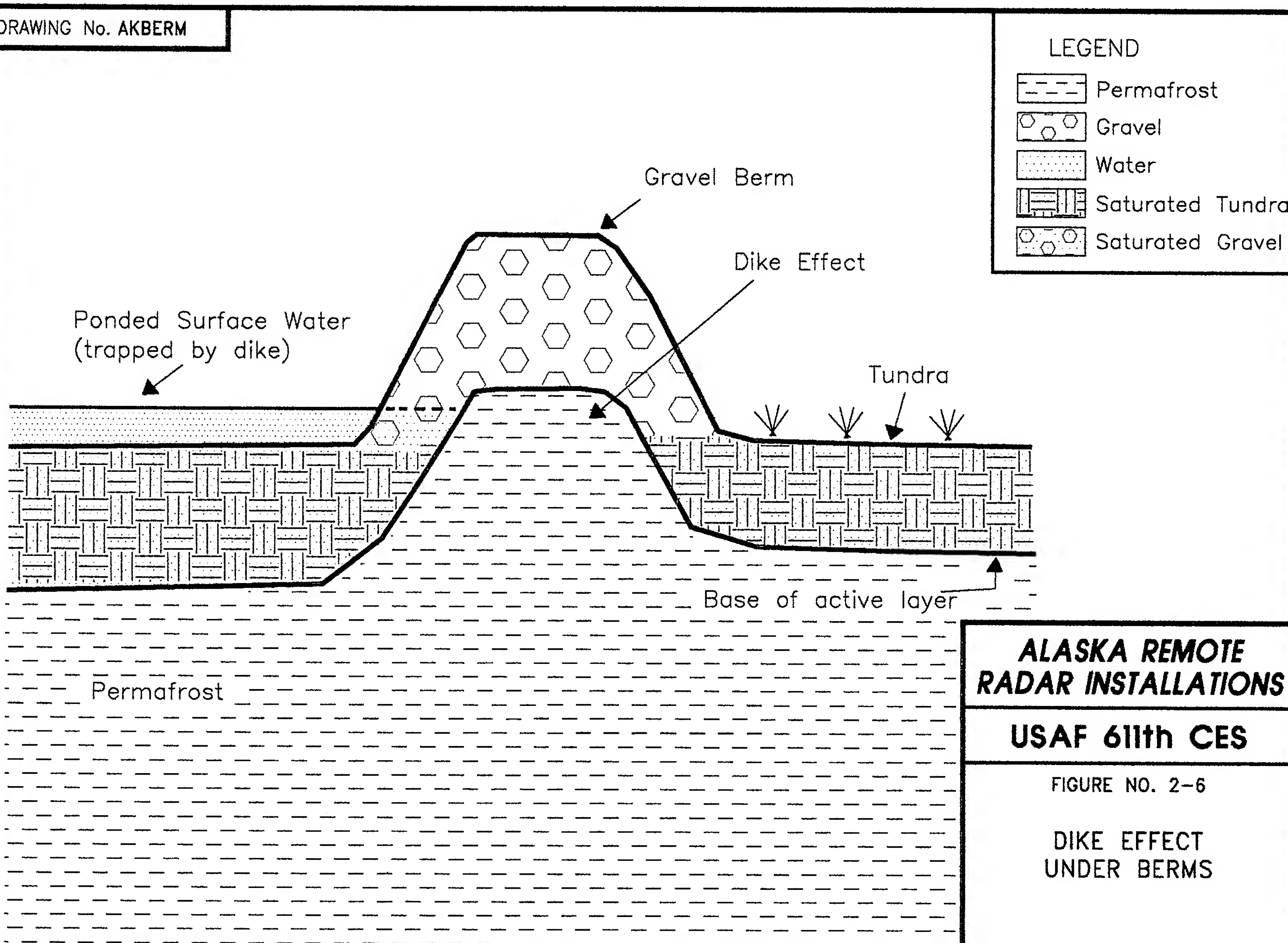

ALASKA REMOTE RADAR INSTALLATIONS

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FIGURE NO. 2-6

DIKE EFFECT UNDER BERMS

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2.4.4.5 Air Transport. Air transportation of contaminants is not considered to be a significant migration pathway at Point Barrow. The frozen conditions encountered most of the year are not conducive to the volatilization of organic contaminants or to the transport of affected dust and dirt. During the summer months the air and ground temperatures remain relatively low (reducing volatility) and the abundant supply of moisture retards the entrainment of affected dust.

2.4.5 Receptors

Three potential human receptor groups were evaluated for the Point Barrow Risk Assessment: an adult assigned to a DEW Line installation (worker), an adult native of the North Slope of Alaska (native), and a native child (child). These receptor groups represent the reasonable maximum exposure at an installation that is in close proximity to a native village and may be released for civilian use at some time in the future.

The primary routes of human exposure evaluated in the Point Barrow Risk Assessment are incidental ingestion of soil/sediment and ingestion of surface water.

For the ecological evaluation, it was assumed that terrestrial and aquatic species are potential receptors for at least the six months of the year when the region is not ice and snow covered. In addition, it was assumed that species that occur at great distances from the specific installations are not receptors (e.g., whales). Whales may migrate off-shore from the DEW Line installation; it is unlikely, however, that these mammals are potential receptors to COCs released from the sites because of dilution of surface water entering the Arctic Ocean and the distance off-shore that these animals migrate. Potential ecological receptors evaluated in the ERA were discussed in Section 2.4.2.

The potential human health and ecological risks to receptors associated with the contaminants detected at the Point Barrow sites are reported on a site-specific basis in Sections 3.0 through 5.0.

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3.0 REMEDIAL INVESTIGATION - NO FURTHER ACTION SITE

This section of the RI/FS presents results from RI sampling and analysis activities for the one Point Barrow site, the Diesel Fuel Spill (SS01), where no further action is recommended. The information presented in this section includes site background, field sampling and analytical results, potential migration pathways, human health and ecological risk assessment summaries, and conclusions and recommendations. (Note: the figure and tables are presented at the end of the section.) The discussions in this section are intended to provide the reader with all information needed to understand the site conditions and make decisions regarding appropriate action for the site.

Photographs of the Point Barrow installation and the sites investigated during the RI are presented in Appendix B. Data tables in this section list analytical results from samples in which chemicals were detected above quantitation limits. Complete laboratory analytical data sheets for each sample, including quantitation limits for non-detected analytes, are presented in Appendix F.

3.1 DIESEL FUEL SPILL (SS01)

3.1.1 Site Background

The Diesel Fuel Spill (SS01) site is an approximately three acre area located north of module train A. A 300-gallon spill occurred at the site in 1974; however, the exact location of the spill is unknown (CH2M Hill 1981). The site consists of two sections: a tundra area to the north adjacent to the POL storage area and a gravel pad area to the south adjacent to the west end of module train B. The POL storage area in the north portion of the site is a bermed area that was used as a storage area for arctic grade diesel fuels from 1956 to 1978. In the south portion of the site, a gravel road raised approximately three feet above the tundra surrounds both module trains. There is a thin layer of gravel below both module trains, and the gravel between the module trains is raised approximately one foot above the tundra. Culverts lead from below the module train north to the tundra area.

The site-specific environmental setting describing the topography, surface water drainage, and soil types is presented in the discussion of potential migration pathways, Section 3.1.3.

3.1.2 Field Sampling and Analytical Results

This section describes the RI sampling and analytical results for samples collected at the Diesel Fuel Spill (SS01) site. The discussion presents a review of laboratory data, data summary tables, contaminants identified, contaminant trends, and information on suspected source areas.

3.1.2.1 Summary of Samples Collected. A total of 27 samples was collected from gravel pads, ponded areas, and streams at the site. These consisted of 12 soil, 8 sediment, and 7 surface water samples. Table 2-2 presents a detailed summary of the samples collected and

the analyses performed during the 1993 RI field activities. Locations of all samples collected at the Diesel Fuel Spill (SS01) are presented in Figure 3-1.

The 12 soil samples were analyzed for DRPH. In addition, four were analyzed for BTEX. Three soil samples were analyzed for GRPH and RRPH, and one was analyzed for VOCs, SVOCs, and TOC.

Eight sediment samples were analyzed for DRPH, GRPH, RRPH, and BTEX. In addition, one sediment sample was analyzed for VOCs, SVOCs, and pesticides.

The seven surface water samples were analyzed for DRPH, GRPH, RRPH, and BTEX. In addition, one surface water sample was analyzed for VOCs, TOC, TSS, and TDS.

3.1.2.2 Analytical Results. The data summary table (Table 3-1) presents analytical results for all samples collected at the site. Detection and quantitation limits, action levels, associated laboratory and field blanks, and background analytical results are presented for each of the analyses. Background levels are listed to allow direct comparison of naturally occurring organic compounds with samples collected from the site. Sample locations and analytical results for the samples at the site are illustrated in Figure 3-1. All organic compounds detected are presented on the figure except when they were a result of laboratory contamination or field decontamination procedures. The exceptions are presented on the data summary table.

The following section presents a discussion of organic compounds detected above background levels at the site. A discussion of TDS, TSS, and TOC is included.

Organics. Organic compounds detected in soil/sediment samples collected at the site include DRPH, GRPH, BTEX compounds, two other VOCs, and two SVOCs. DRPH were detected in 11 soil/sediment samples ranging from 13.1 to 3,960 mg/kg. GRPH were detected in five soil/sediment samples at concentrations ranging from 12 to 210 mg/kg. BTEX (total) were detected in six soil/sediment samples ranging from 0.4 to 19.35 mg/kg; xylenes were the primary component. Two other VOCs (1,2,4- and 1,3,5-trimethylbenzene) were detected at concentrations of 0.903 to 0.396 mg/kg, respectively, in soil sample SS01-S01-2; both are components of diesel. Two SVOCs were detected at concentrations of 3.42 and 20.1 mg/kg in two soil/sediment samples. These two phthalate compounds were also detected in the associated laboratory blank and are common laboratory contaminants.

In surface water samples, organic compounds detected at the site include GRPH, BTEX, and seven other VOCs. GRPH were detected in one sample, SS01-SW01, at 1,690 μg/L. BTEX compounds were detected in two surface water samples at concentrations of 2 and 380 μg/L; xylenes were the primary component. Seven other VOCs were detected in surface water sample SS01-SW01 at concentrations ranging from 1.5 to 92 μg/L. The primary VOCs detected were naphthalene (58 μg/L), 1,2,4-trimethylbenzene (92 μg/L), and 1,3,5-trimethylbenzene (52 μg/L).

Inorganics. Metals were not a concern at the site, and no metals analyses were performed. TOC, TSS, and TDS were reported at 43,600; 90,000; and 586,000 μg/L, respectively, in surface water sample SS01-SW01.

3.1.2.3 Summary of Site Contamination. The primary contaminants at the site are petroleum hydrocarbons (DRPH and GRPH), BTEX, and other VOCs commonly associated with gasoline and diesel fuel. The suspected source of contaminants detected during sampling conducted at the Diesel Fuel Spill site is diesel spills and/or leaks associated with the diesel day tank at the west end of module train B. No previous IRP sampling is known to have been conducted at the site. The human health and ecological risks associated with the chemicals detected at the site are presented in Sections 3.1.4 and 3.1.5.

3.1.3 Migration Pathways

This section describes the topography and stratigraphy of the site and the migration potential of contaminants from the site. A discussion of receptors and chemical concentrations at receptors is included.

3.1.3.1 Topography and Stratigraphy. Very little topographic relief is expressed at the site. The tundra surface slopes only very slightly to the northeast. Drainage in the area is generally to the northeast towards North Salt Lagoon. The greatest relief at the site is from gravel roads and berms. An approximately three-feet-thick gravel road surrounds both module trains effectively berming the area. Inside the gravel road berm is an approximately one-foot-thick gravel pad. During the 1993 RI, a long narrow ditch approximately three feet deep extended between the west ends of the module trains; this ditch may have been related to site utilities. A gravel berm approximately five feet thick surrounds the POL tanks. This berm is connected on the west side to a gravel road, which creates a dike effect to water in the tundra area south of the road (Figure 2-6).

The active layer at this site was approximately two feet thick in tundra areas and four feet thick under gravel pads and roads during the 1993 RI. Gravel pad material consisted of the typical gravels and sands associated with these features, and subsurface tundra materials were of the typical stratigraphy found at Point Barrow (Section 2.4.4.2).

3.1.3.2 Migration Potential.

Subsurface Migration. Drainage at the site is generally to the northeast, indicating that subsurface water flow should also be to the northeast towards North Salt Lagoon. The lack of significant topographic relief indicates that the hydraulic gradient should be relatively small and flow velocities correspondingly low. The major surface water bodies are a water-filled ditch that extends along the western ends of the module train buildings, and a long narrow ponded area west of the POL storage area. The ponded area is very shallow and stretches between two gravel roads that effectively berm the northern and southern ends. This feature re-emerges on the other side of the northern road, where it is fed by active layer water springs. Another spring is located across the road from the module train, between the ponded area and a POL pipe. This spring feeds a small puddle, which drains through a marshy area into the ponded area.

Analytical data indicate that limited onsite migration has occurred in the active layer. Petroleum compounds (DRPH, GRPH, and BTEX) were detected in subsurface soil samples surrounding the west end of the module train B. The small ponded area immediately north of the road, which

is fed by active layer water springs, was affected by low levels of GRPH and BTEX. These analytes were detected at higher concentrations in the upgradient samples indicating that limited transport has occurred.

Distinct surface water bodies are not present in the downgradient (north) areas of this site, which consist of marshy tundra. Because the water table is at the surface in these marshy areas, any contaminants in the active layer may enter the surface water when they reach the marshy areas. No contaminants were detected in surface water and sediment samples from the marshy areas suggesting that contaminants have not been transported offsite in active layer water.

Surface Migration. Surface water and sediment samples collected from water bodies in the vicinity of the module trains and POL storage facility indicate that some contamination of surface water has occurred. GRPH, BTEX, and VOCs were detected in water samples collected from surface water features north of the module trains and west of the POL storage facility. Analytical data indicate that contaminants are not migrating offsite.

Air Transport. Air transportation is not considered to be a significant mode of migration at the site (Section 2.4.4.5).

Summary of Migration Potential. Analytical data suggest that offsite migration of contaminants in active layer water has not occurred, although limited onsite migration has occurred in both the surface and subsurface. Berms, flat topography, and the lack of drainage features indicates that the potential for surface migration from the site is limited.

3.1.3.3 Receptors and Chemical Concentrations at Receptors.

Human Receptors. Potential human receptors at the Diesel Fuel Spill (SS01) site include Air Force contractor personnel working at the station, visitors to the station, and an occasional local visitor passing the site to get to recreational or subsistence lands. Human receptors could potentially be exposed to the chemicals detected in surface water and soil/sediments at the site. The primary routes of potential exposures at the site are direct contact with, and incidental ingestion of, soil/sediment and ingestion of surface water. Because ground water and air at the Point Barrow sites are not considered complete pathways of exposure, these media are not evaluated as potential pathways to human receptors.

The Point Barrow Risk Assessment (U.S. Air Force 1996) evaluates in detail the risks to human health from all COCs detected at the site. The potential receptor groups were selected based on their likelihood of exposure to contaminants at the site. The potential receptor groups evaluated include DEW Line workers at the installation, and native adults and children who may visit the site. The estimated exposure point concentrations for human receptors are based on the maximum concentration of each chemical detected at the site. The potential risks to human health associated with site chemicals at Point Barrow are presented in Section 3.1.4.

Ecological Receptors. Ecological receptors were evaluated in detail in the Point Barrow Risk Assessment (U.S. Air Force 1996) to determine if plants and animals could potentially be affected by the chemicals detected at the Point Barrow installation. Because of the diversity of the plants

and animals in the area of the Point Barrow installation, a set of representative species was selected in the ERA for detailed evaluation. The species include plants, aquatic invertebrates, fish, birds, and mammals. These receptors were selected based on the likelihood of exposure given their preferred habitat and feeding habits. The representative species encompass a range of ecological niches in order to achieve the best characterization of the ecosystems being examined and are presented in Table 2-6.

The estimate of chemical concentrations at the ecological receptors was based on the average site-wide concentration of each COC. This approach was appropriate because few of the representative species would inhabit only one distinct site at the installation; they are more likely to be exposed to the mix of chemicals and concentrations detected on all the sites at Point Barrow. The potential ecological risks associated with the chemicals at detected at the site are presented in Section 3.1.5.

3.1.4 Human Health Risk Assessment

This section presents a summary of the potential human health risks associated with the chemicals detected at the Diesel Fuel Spill (SS01) site. The purpose of the human health risk assessment is to quantify the excess lifetime cancer risk and/or the noncancer hazard (reported as hazard index) from the chemicals detected at the site.

This summary presents the COCs at the site, the pathways by which human receptors may be exposed to site chemicals, potential risks to human health posed by each chemical through each exposure pathway evaluated, the significance of the risk and/or hazard estimate, and a comparison of site chemical concentrations to RBSLs and ARARs. The methods and assumptions used in calculating hazards and risks are presented in Section 2.4.1.

3.1.4.1 Chemicals of Concern. DRPH and GRPH were identified as COCs for the soil matrix at the Diesel Fuel Spills site. The maximum concentrations of DRPH and GRPH exceeded their background concentrations and the ARAR concentrations for petroleum hydrocarbon contamination of soil (ADEC 1991).

GRPH and benzene were identified as a COCs for the surface water at the site. GRPH exceeded the background concentration and the RBSLs based on cancer risk and noncancer hazard. Benzene exceeded the background concentration, the RBSL based on cancer risk, and the ARAR, which is a maximum contaminant level (MCL) promulgated under the federal Safe Drinking Water Act.

Table 3-2, Identification of COCs at the Diesel Fuel Spill, presents the maximum concentrations of chemicals detected at the site, the associated background concentrations, RBSLs, and ARARs, and identifies COCs selected in the risk evaluation.

3.1.4.2 Exposure Pathways and Potential Receptors. Because COCs were identified for soil/sediment and surface water at the site, the potential risks associated with ingestion of soil/sediment and surface water were evaluated in the risk assessment.

Three potential receptor groups were evaluated in the risk assessment: an adult assigned to a DEW Line installation (worker), an adult inhabitant of communities in the North Slope of Alaska (native), and a child living in a North Slope community (child).

3.1.4.3 Risk Characterization.

Noncancer Hazard and Cancer Risk Associated with Soils and Sediments. The noncancer hazard associated with the ingestion of soil at the site by a hypothetical native northern adult/child is 0.06, and by a DEW Line worker is 0.003, based on the maximum concentrations of the COCs. The presence of DRPH and GRPH accounts entirely for the quantifiable noncancer hazard for these receptor/pathway combinations.

The excess lifetime cancer risk associated with the ingestion of soil or sediment at the site by a hypothetical native northern adult/child is 6×10^{-8}, and by a DEW Line worker is 3×10^{-9}, based on the maximum concentration of the carcinogenic COC. The presence of GRPH accounts entirely for the quantifiable excess lifetime cancer risk for these receptor/pathway combinations.

Noncancer Hazard and Cancer Risk Associated with Surface Water. The noncancer hazard associated with the ingestion of surface water at the Diesel Fuel Spill site by a hypothetical native northern adult and by a DEW Line worker is 0.1 based on the maximum concentrations of the COC. GRPH accounts entirely for the quantifiable noncancer hazard for these receptor/pathway combinations.

The excess lifetime cancer risk associated with the ingestion of surface water at the site by a native northern adult is 3×10^{-5}, and by a DEW Line worker is 6×10^{-6}, based on the maximum concentrations of the COCs. The presence of GRPH and benzene accounts entirely for the quantifiable excess lifetime cancer risk for these receptor/pathway combinations. GRPH alone accounts for 90 percent of the cancer risk.

3.1.4.4 Summary of Human Health Risk Assessment. The potential risks and hazards associated with the soil/sediment at the Diesel Fuel Spill site are limited to the low noncancer hazards (hazard indices of 0.003 and 0.06) and the very low cancer risk associated with GRPH. The noncancer hazards are below one and the cancer risk are below the threshold level of 1×10^{-6}. Both were calculated conservatively based on a residential scenario. Therefore, the noncancer hazards and cancer risks associated with soil/sediment at the site are minimal.

A hazard index of 0.1 is associated with GRPH in surface water at the site indicating a minimal noncancer risk. The cancer risk for the native adult is 3×10^{-5}, and for a DEW Line worker is 6×10^{-6}; neither exceed the 1×10^{-4} threshold level at which remediation is usually recommended (EPA 1991b). The potential hazards and risks were calculated assuming the affected surface water would be used as a sole-source water supply for 180 days per year. Based on site-specific information, the chemicals in surface water do not currently pose a health hazard nor are they likely to pose a hazard in the future. The surface water expressions at the site are frozen most of the year; many are only intermittently filled with water during the summer months. The surface water at the site is not known to be used as a water supply now, nor has it been used in the past. In conclusion, under current uses the COCs identified in surface water at the Diesel Fuel

Spill site pose only a minimal, if any, potential threat to human health. In the unlikely event that surface water at the site is used as a sole-source drinking water supply in the future, a potential noncancer hazard to human health could exist if conditions remain constant.

In conclusion, under current uses the COCs identified soil/sediment and surface water at the Diesel Fuel Spill pose only minimal, if any, potential threat to human health. Based on the human health risk assessment, remedial actions are not warranted at the site.

3.1.5 Ecological Risk Assessment

The objective of the ecological risk assessment is to estimate the potential impacts of chemicals detected at the Point Barrow installation to aquatic and terrestrial plants and animals. A summary of the methods used to assess potential ecological impacts is presented in Section 2.4.2.

3.1.5.1 Chemicals of Concern. COCs were selected based on criteria presented in Section 3.1 of the ERA. The average installation-wide concentrations of COCs were used to calculate the risk estimates. All sites at the installation were considered to be potentially usable habitat. It should be noted that the COC selection process only considered the soil/sediment samples that were at or less than 1.5 feet deep. The soil/sediment samples were screened for depth because it is unlikely that any of the representative species will be exposed to soils/sediments deeper than 1.5 feet. GRPH were identified as a COC in surface water. The COCs in soils/sediments at the Diesel Fuel Spill were DRPH, toluene, and xylenes. None of the identified COCs were associated with significant ecological risk estimates at the Diesel Fuel Spill site.

3.1.5.2 Summary of Ecological Risk Assessment. Based on the quantification of potential risks to ecological receptors and discussions presented in the Point Barrow ERA, ecological risks at the Diesel Fuel Spill site are unlikely.

3.1.6 Conclusions and Recommendations

Sampling and analyses have determined that the Diesel Fuel Spill (SS01) site is contaminated with petroleum compounds (DRPH and GRPH), BTEX, and other VOCs commonly associated with gas and diesel fuel. The contaminated media at the site include soil, gravel pad, tundra, and surface water in the vicinity of the module train B. The source of contamination is suspected to be diesel spills and/or leaks associated with the diesel day tank at the west end of module train B. However, analytical data indicate that limited on site contaminant migration has occurred in the active layer and surface water, and contaminants do not appear to be migrating off site.

The risk assessment concluded that risks posed to human health or ecological receptors by site contaminants are minimal given current or future site uses. The risks and hazards are based on a conservative future scenario and are not of a magnitude that normally requires remedial action.

Based on RI sampling and analyses, risk assessment and current and future site uses, remedial actions are not warranted at the site. Chemicals detected at the site did not pose significant

human health or ecological risks; therefore, the Diesel Fuel Spill (SS01) site is recommended for no further action.

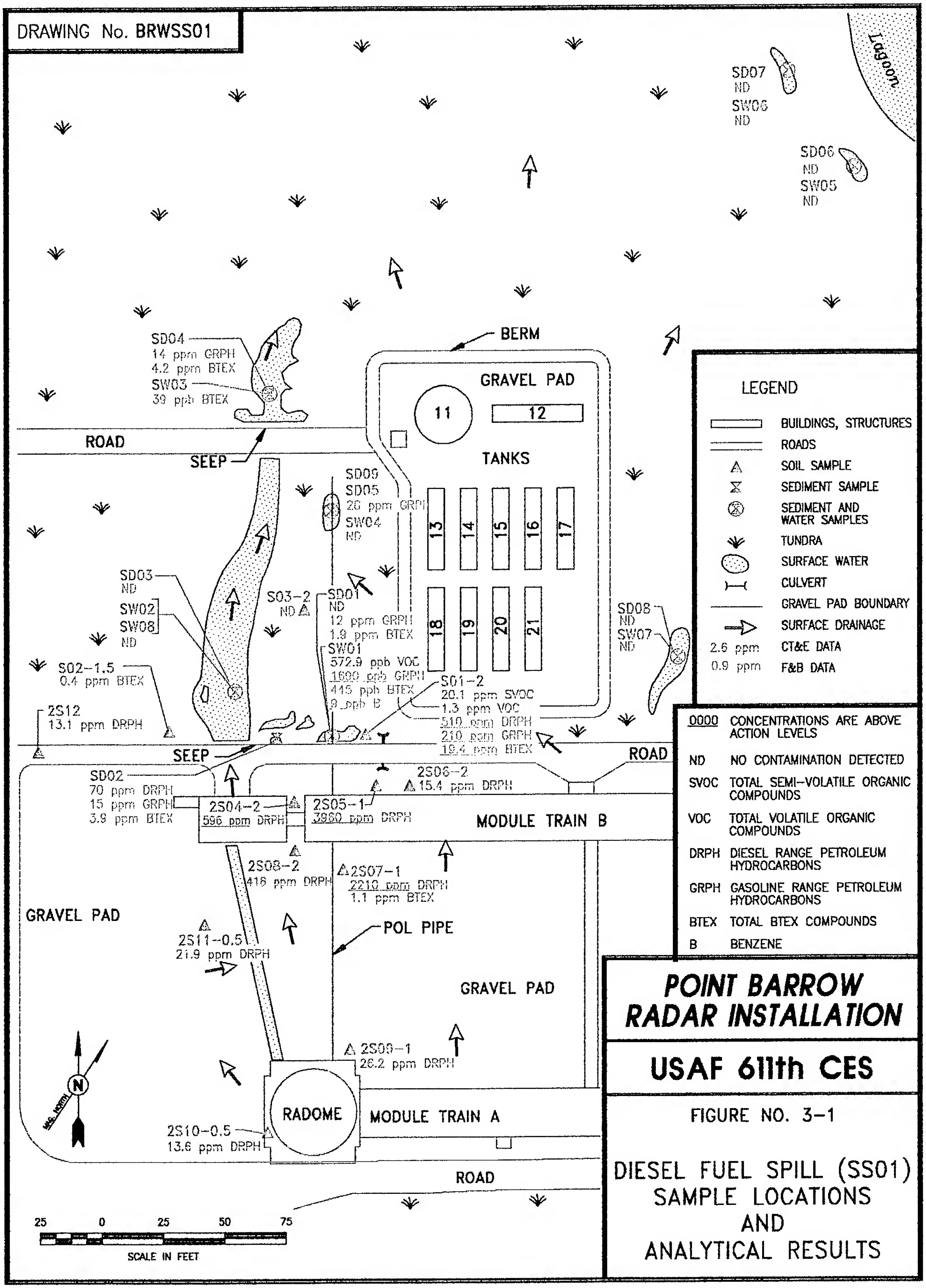
DRAWING No. BRWSS01
Lagoon
SD07
ND
SW06
ND
SD06
ND
SW05
ND
BERM
GRAVEL PAD
11
12
TANKS
13
14
15
16
17
18
19
20
21
SD04
14 ppm GRPH
4.2 ppm BTEX
SW03
39 ppb BTEX
ROAD
SEEP
SD09
SD05
26 ppm GRPH
SW04
ND
SD03
ND
SW02
SW08
ND
S03-2
ND
SD01
ND
12 ppm GRPH
1.9 ppm BTEX
SW01
572.9 ppb VOC
1600 ppb GRPH
415 ppb BTEX
9 ppb B
S02-1.5
0.4 ppm BTEX
2S12
13.1 ppm DRPH
S01-2
20.1 ppm SVOC
1.3 ppm VOC
510 ppm DRPH
210 ppm GRPH
19.4 ppm BTEX
SD08
ND
SW07
ND
SEEP
ROAD
SD02
70 ppm DRPH
15 ppm GRPH
3.9 ppm BTEX
2S04-2
596 ppm DRPH
2S05-1
3960 ppm DRPH
2S06-2
15.4 ppm DRPH
MODULE TRAIN B
2S08-2
416 ppm DRPH
2S07-1
2210 ppm DRPH
1.1 ppm BTEX
GRAVEL PAD
2S11-0.5
21.9 ppm DRPH
POL PIPE
GRAVEL PAD
2S09-1
26.2 ppm DRPH
N
MAG. NORTH
RADOME
MODULE TRAIN A
2S10-0.5
13.6 ppm DRPH
ROAD
25 0 25 50 75
SCALE IN FEET
LEGEND
BUILDINGS, STRUCTURES
ROADS
SOIL SAMPLE
SEDIMENT SAMPLE
SEDIMENT AND WATER SAMPLES
TUNDRA
SURFACE WATER
CULVERT
GRAVEL PAD BOUNDARY
SURFACE DRAINAGE
2.6 ppm CT&E DATA
0.9 ppm F&B DATA
0000 CONCENTRATIONS ARE ABOVE ACTION LEVELS
ND NO CONTAMINATION DETECTED
SVOC TOTAL SEMI-VOLATILE ORGANIC COMPOUNDS
VOC TOTAL VOLATILE ORGANIC COMPOUNDS
DRPH DIESEL RANGE PETROLEUM HYDROCARBONS
GRPH GASOLINE RANGE PETROLEUM HYDROCARBONS
BTEX TOTAL BTEX COMPOUNDS
B BENZENE
POINT BARROW RADAR INSTALLATION
USAF 611th CES
FIGURE NO. 3-1
DIESEL FUEL SPILL (SS01) SAMPLE LOCATIONS AND ANALYTICAL RESULTS

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TABLE 3-1. DIESEL FUEL SPILL ANALYTICAL DATA SUMMARY

Installation: Point Barrow
Site: Diesel Fuel Spill (SS01)

Matrix: Soil/Sediment
Units: mg/kg

Parameters	Detect. Limits	Quant. Limits	Action Levels	Bkgd. Levels	Environmental Samples						Field Blanks			Lab Blanks	
					S01-2	S02-1.5	S03-2	SD01	SD02	SD03	AB01	EB01	TB02		
Laboratory Sample ID Numbers					1198 4424-8	1200	1202	1136 4424-7	1138	1140	4395-2	1156/1158 4424-4	1154 4424-5	#5-9193 4424 4395	#1&2-9293 #5-83193 4424
ANALYSES	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/L	µg/L	µg/L	µg/L	mg/kg
DRPH	6-10	60-100	500^a	<65J^b-<180J^b	510J^b	<100^b	<80^b	<60^b	70J^b	<60^b	NA	<1,000^b	NA	<200	<50
GRPH	0.1	1	100	<3J^b-<7J^b	210J^b	<1J^b	<1^b	12J^b	15J^b	<1J^b	NA	<100J^b	<100J^b	NA	<1
RRPH (Approx.)	12-20	120-200	2,000^a	<130-<360	<120	<200	<160	<120	<120	<120	NA	<2,000	NA	<2,000	<100
BTEX (8020/8020 Mod.)			10 Total BTEX	<0.14-<0.31	19.35J	0.4	0.1JR	1.88J	3.90J	<0.10					
Benzene	0.002-0.004	0.02-0.04	0.5	<0.03-<0.07	0.15J	<0.04	<0.03	<0.02	0.17J	<0.02	<1^c	<1	<1	<1	<0.02
Toluene	0.002-0.004	0.02-0.04		<0.03-<0.07	1.5	0.4	0.1R	0.2	0.43	<0.02	<1^c	<1	<1	<1	<0.02
Ethylbenzene	0.002-0.004	0.02-0.04		<0.03-<0.07	3.7	<0.04	<0.03	0.8	1.2	<0.02	<1^c	<1	<1	<1	<0.02-<0.03
Xylenes (Total)	0.004-0.008	0.04-0.08		<0.05-<0.1	14J	<0.08	<0.06	0.8J	2.1J	<0.04	<2^c	<2	<2	<2	<0.04-<0.04
VOC 8260															
1,2,4-Trimethyl-benzene	0.020	0.250-0.350		<0.050J	0.903	NA	NA	<0.250	NA	NA	<1	<1	<1	<1	<0.020
1,3,5-Trimethyl-benzene	0.020	0.250-0.350		<0.050J	0.396	NA	NA	<0.250	NA	NA	<1	<1	<1	<1	<0.020
SVOC 8270															
di-n-Butylphthalate	0.200	2.40-9.30	8,000	<3.80-<40.0	20.1B	NA	NA	5.19B	NA	NA	NA	NA	NA	<10	1.610
bis (2-Ethylhexyl) Phthalate	0.200	2.40-9.30	50	<3.80-<40	<9.30	NA	NA	3.42B	NA	NA	NA	NA	NA	<10	<0.200
Pesticides	0.001-0.05	0.01-0.5		<0.01J-<1.8J	NA	NA	NA	<0.01J-<0.5R	NA	NA	NA	<0.2J-<25R	NA	NA	NA

☐ CT&E Data.
▩ F&B Data.
NA Not analyzed.
B The analyte was detected in the associated blank.
J Result is an estimate.
R Result has been rejected.
a The action levels for DRPH and RRPH are based on conversations with ADEC; final action levels have not yet been determined.
b DRPH and GRPH concentrations reported for these samples are equivalent to diesel and gasoline range organics (DRO and GRO) as defined by ADEC.
c BTEX determined by 8260 method analysis.

TABLE 3-1. DIESEL FUEL SPILL ANALYTICAL DATA SUMMARY (CONTINUED)

Installation: Point Barrow
Site: Diesel Fuel Spill (SS01)
Matrix: Soil/Sediment
Units: mg/kg

Parameters	Detect. Limits	Quant. Limits	Action Levels	Bkgd. Levels	Environmental Samples						Field Blanks			Lab Blanks	
					S01-2	S02-1.5	S03-2	SD01	SD02	SD03	AB01	EB01	TB02		
Laboratory Sample ID Numbers					1198 4424-8	1200	1202	1136 4424-7	1138	1140	4395-2	1156/1158 4424-4	1154 4424-5	#5-9193 4424 4395	#1&2-9293 #5-83193 4424
ANALYSES	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/L	µg/L	µg/L	µg/L	mg/kg
TOC				84,200-297,000	53,800	NA	NA	NA	NA	NA	NA	NA	NA	<5,000	NA

☐ CT&E Data.
NA Not analyzed.

TABLE 3-1. DIESEL FUEL SPILL ANALYTICAL DATA SUMMARY (CONTINUED)

Installation: Point Barrow
Site: Diesel Fuel Spill (SS01)
Matrix: Sediment
Units: mg/kg

Parameters	Detect. Limits	Quant. Limits	Action Levels	Bkgd. Levels	Environmental Samples						Field Blanks			Lab Blanks	
					SD04	SD05 & SD09 (Replicates)		SD06	SD07	SD08	AB01	EB01	TB02		
Laboratory Sample ID Numbers					1142	1144	1196	1190	1192	1194	4395-2	1156/1158 4424-4	1154 4424-5	#5-9193 4395	#1&2-9293 #5-83193
ANALYSES	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/L	µg/L	µg/L	µg/L	mg/kg
DRPH	6	60	500[a]	<65J[b]-<180J[b]	<60[b]	<60[b]	<60[b]	<60[b]	<60[b]	<60[b]	NA	<1,000[b]	NA	<200	<50
GRPH	0.1	1	100	<3J[b]-<7J[b]	14J[b]	28J[b]	<1J[b]	30R[b]	<1J[b]	<1J[b]	NA	<100J[b]	<100J[b]	NA	<1
RRPH (Approx.)	12	120	2,000[a]	<130-<360	<120	<120	<120	<120	<120	<120	NA	<2,000	NA	<2,000	<100
BTEX (8020/8020 Mod.)			10 Total BTEX	<0.14-<0.31	4.24J	<0.10	<0.10	<0.10	<0.10	<0.10					
Benzene	0.002	0.02	0.5	<0.03-<0.07	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<1[c]	<1	<1	<1	<0.02
Toluene	0.002	0.02		<0.03-<0.07	0.08	<0.02	<0.02	<0.02	<0.02	<0.02	<1[c]	<1	<1	<1	<0.02
Ethylbenzene	0.002	0.02		<0.03-<0.07	0.86	<0.02	<0.02	<0.02	<0.02	<0.02	<1[c]	<1	<1	<1	<0.02-<0.03
Xylenes (Total)	0.004	0.04		<0.05-<0.1	3.5J	<0.04	<0.04	<0.04	<0.04	<0.04	<2[c]	<2	<2	<2	<0.04-<0.09

□ CT&E Data.
▩ F&B Data.
NA Not analyzed.
J Result is an estimate.
R Result has been rejected.
a The action levels for DRPH and RRPH are based on conversations with ADEC; final action levels have not yet been determined.
b DRPH and GRPH concentrations reported for these samples are equivalent to diesel and gasoline range organics (DRO and GRO) as defined by ADEC.
c BTEX determined by 8260 method analysis.

TABLE 3-1. DIESEL FUEL SPILL ANALYTICAL DATA SUMMARY (CONTINUED)

Installation: Point Barrow — Matrix: Soil
Site: Diesel Fuel Spill (SS01) — Units: mg/kg

Parameters	Detect. Limits	Quant. Limits	Action Levels	Bkgd. Levels	Environmental Samples						Field Blanks			Lab Blanks	
					2S04-2	2S05-1	2S06-2	2S07-1	2S08-2	2S09-1	AB01	2EB02	2TB03		
Laboratory Sample ID Numbers					4627-2	4627-3	4627-4	4627-5	4627-6	4627-7	4395-2	4627-23	4627-22	4627 4395	4627
ANALYSES	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/L	µg/L	µg/L	µg/L	mg/kg
DRPH	4.00	4.00	500[a]	<65J[b]-<180J[b]	596[de]	3,960[d]	15.4[f]	2,210[d]	416[g]	26.2[h]	NA	NA	NA	NA	<4.00
BTEX (8020/8020 Mod.)			10 Total BTEX	<0.14-<0.31	NA	NA	NA	1.06N	NA	NA					
Benzene	0.020	0.250	0.5	<0.03-<0.07	NA	NA	NA	<0.250	NA	NA	<1[c]	<1[c]	<1[c]	<1	<0.020
Toluene	0.020	0.250		<0.03-<0.07	NA	NA	NA	0.082N	NA	NA	<1[c]	<1[c]	<1[c]	<1	<0.020
Ethylbenzene	0.020	0.250		<0.03-<0.07	NA	NA	NA	0.208N	NA	NA	<1[c]	<1[c]	<1[c]	<1	<0.020
Xylenes (Total)	0.040	0.500		<0.05-<0.1	NA	NA	NA	0.770N	NA	NA	<2[c]	<2[c]	<2[c]	<2	<0.020

□ CT&E Data.
▩ F&B Data.
NA Not analyzed.
J Result is an estimate.
N The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification".
a The action level for DRPH is based on conversations with ADEC; a final action level has not yet been determined.
b DRPH concentrations reported for these samples are equivalent to diesel range organics (DRO) as defined by ADEC.
c BTEX determined by 8260 method analysis.
d The laboratory reported that sample concentration was determined using a secondary dilution.
e The laboratory reported that 102 mg/kg of the EPH pattern in this sample was not consistent with a middle distillate fuel.
f The laboratory reported that 12.3 mg/kg of the EPH pattern in this sample was not consistent with a middle distillate fuel.
g The laboratory reported that 53.0 mg/kg of the EPH pattern in this sample was not consistent with a middle distillate fuel.
h The laboratory reported that 15.6 mg/kg of the EPH pattern in this sample was not consistent with a middle distillate fuel.

TABLE 3-1. DIESEL FUEL SPILL ANALYTICAL DATA SUMMARY (CONTINUED)

Installation: Point Barrow   Matrix: Soil
Site: Diesel Fuel Spill (SS01)   Units: mg/kg

Parameters	Detect. Limits	Quant. Limits	Action Levels	Bkgd. Levels	Environmental Samples						Field Blanks			Lab Blank
					2S10-0.5	2S11-0.5	2S12				AB01	2EB02	2TB03	
Laboratory Sample ID Numbers					4627-8	4627-9	4627-10				4395-2	4627-23	4627-22	4627
ANALYSES	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg				µg/L	µg/L	µg/L	mg/kg
DRPH	4.00	4.00	500[a]	<65J[b]-<180J[b]	13.6[c]	21.9[d]	13.1[d]				NA	NA	NA	<4.00

☐ CT&E Data.
▩ F&B Data.
NA Not analyzed.
J Result is an estimate.
a The action level for DRPH is based on conversations with ADEC; a final action level has not yet been determined.
b DRPH concentrations reported for these samples are equivalent to diesel range organics (DRO) as defined by ADEC.
c The laboratory reported that 8.99 mg/kg of the EPH pattern in this sample was not consistent with a middle distillate fuel.
d The laboratory reported that the EPH pattern in this saple was not consistent with a middle distillate fuel.

TABLE 3-1. DIESEL FUEL SPILL ANALYTICAL DATA SUMMARY (CONTINUED)

Installation: Point Barrow
Site: Diesel Fuel Spill (SS01)
Matrix: Surface Water
Units: µg/L

Parameters	Detect. Limits	Quant. Limits	Action Levels	Bkgd. Levels	Environmental Samples								Field Blanks			Lab Blanks
					SW01	SW02 & SW08 (Duplicates)		SW03	SW04	SW05	SW06	SW07	AB01	EB01	TB02	
Laboratory Sample ID Numbers					1160/1162 4424-8	1164/1166	1209	1168/1170	1172/1174	1176/1178	1180/1182	1184/1208	4395-2	1156/1158 4424-4	1154 4424-5	4395 #5-9193 4424
ANALYSES	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
DRPH	100	1,000		<1,000[b]	<1,000[b]	<1,000[b]	<1,000[b]	<1,000[b]	<1,000[b]	<1,000[b]	<1,000[b]	<1,000[b]	NA	<1,000[b]	NA	<200
GRPH	10	100		<50J[b]	1,690[b]	<100J[b]	<100J[b]	<100J[b]	<100J[b]	<100J[b]	<100J[b]	<100J[b]	NA	<100J[b]	<100J[b]	NA
RRPH (Approx.)	200	2,000		<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	NA	<2,000	NA	<2,000
BTEX (8020/8020 Mod.)																
Benzene	0.1	1	5	<1	9	<1	<1	2	<1	<1	<1	<1	<1[c]	<1	<1	<1
Toluene	0.1	1	1,000	<1	42J	<1	<1	2J	<1	<1	<1	<1	<1[c]	<1	<1	<1
Ethylbenzene	0.1	1	700	<1	14J	<1	<1	6J	<1	<1	<1	<1	<1[c]	<1	<1	<1
Xylenes (Total)	0.2	2	10,000	<2	380J	<2	<2	29J	<2	<2	<2	<2	<2[c]	<2	<2	<2
VOC 8260																
Benzene	1	1	5	<1	3.5	NA	NA	NA	NA	NA	NA	NA	<1	<1	<1	<1
sec-Butylbenzene	1	1		<1	1.5	NA	NA	NA	NA	NA	NA	NA	<1	<1	<1	<1
Ethylbenzene	1	1	700	<1	13	NA	NA	NA	NA	NA	NA	NA	<1	<1	<1	<1
Isopropyl-benzene	1	1		<1	4.8	NA	NA	NA	NA	NA	NA	NA	<1	<1	<1	<1
p-Isopropyl-toluene	1	1		<1	4.0	NA	NA	NA	NA	NA	NA	NA	<1	<1	<1	<1
Naphthalene	1	1		<1	58	NA	NA	NA	NA	NA	NA	NA	<1	<1	<1	<1
n-Propylbenzene	1	1		<1	4.1	NA	NA	NA	NA	NA	NA	NA	<1	<1	<1	<1
Toluene	1	1	1,000	<1	28	NA	NA	NA	NA	NA	NA	NA	<1	<1	<1	<1

☐ CT&E Data.
▩ F&B Data.
NA Not analyzed.
J Result is an estimate.
c BTEX determined by 8260 method analysis.
b DRPH and GRPH concentrations reported for these samples are equivalent to diesel and gasoline range organics (DRO and GRO) as defined by ADEC.

TABLE 3-1. DIESEL FUEL SPILL ANALYTICAL DATA SUMMARY (CONTINUED)

Installation: Point Barrow
Site: Diesel Fuel Spill (SS01)
Matrix: Surface Water
Units: µg/L

Parameters	Detect. Limits	Quant. Limits	Action Levels	Bkgd. Levels	Environmental Samples								Field Blanks			Lab Blanks
					SW01	SW02 & SW08 (Duplicates)		SW03	SW04	SW05	SW06	SW07	AB01	EB01	TB02	
Laboratory Sample ID Numbers					1160/1162 4424-6	1164/1166	1209	1168/1170	1172/1174	1176/1178	1180/1182	1184/1208	4395-2	1156/1158 4424-4	1154 4424-5	4395 #5-9193 4424
ANALYSES	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
1,2,4-Trimethyl-benzene	1	1		<1	92	NA	NA	NA	NA	NA	NA	NA	<1	<1	<1	<1
1,3,5-Trimethyl-benzene	1	1		<1	52	NA	NA	NA	NA	NA	NA	NA	<1	<1	<1	<1
Xylenes (Total)	2	2	10,000	<2	312	NA	NA	NA	NA	NA	NA	NA	<2	<2	<2	<2
TOC	5,000	5,000		16,700-22,500	43,600	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<5,000
TSS	100	200		5,000-6,000	90,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<200
TDS	10,000	10,000		166,000-213,000	586,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<10,000

☐ CT&E Data.
NA Not analyzed.

TABLE 3-2. IDENTIFICATION OF CHEMICALS OF CONCERN AT THE DIESEL FUEL SPILL (SS01)

SITE	MATRIX	CHEMICAL DETECTED	MAXIMUM CONCENTRATION	UNITS	BACKGROUND RANGE	RBSL[a]		ARAR[b]	CHEMICAL OF CONCERN
						CANCER	NON-CANCER		
Diesel Fuel Spill (SS01)	Soil	DRPH	3,960	mg/kg	<65J-<180J	--	--	500[c]	**Yes**
		GRPH	210J	mg/kg	<3J-<7J	--	--	100[c]	**Yes**
		Benzene	0.17J	mg/kg	<0.03-<0.07	2.21	--	0.5[c]	No
		Toluene	1.5	mg/kg	<0.03-<0.07	--	5,400	--	No
		Ethylbenzene	3.7	mg/kg	<0.03-<0.07	--	2,700	--	No
		Xylenes (Total)	14J	mg/kg	<0.05-<0.1	--	54,000	--	No
		1,2,4-Trimethylbenzene	0.903	mg/kg	<0.050J	--	--	--	**Yes***
		1,3,5-Trimethylbenzene	0.396	mg/kg	<0.050J	--	--		**Yes***
	Surface Water	GRPH	1,690	μg/L	<50J	50	730	--	**Yes**
		Benzene	9	μg/L	<1	0.617	--	5[d]	**Yes**
		Toluene	42J	μg/L	<1	--	96.5	1,000[e]	No
		Ethylbenzene	14J	μg/L	<1	--	158	700[e]	No
		Xylenes (Total)	380J	μg/L	<2	--	7,300	10,000[e]	No
		sec-Butylbenzene	1.5	μg/L	<1	--	--	--	**Yes***
		Isopropylbenzene	4.8	μg/L	<1	--	--	--	**Yes***
		p-Isopropyltoluene	4.0	μg/L	<1	--	--	--	**Yes***
		Naphthalene	58	μg/L	<1	--	150	--	No
		n-Propylbenzene	4.1	μg/L	<1	--	--	--	**Yes***
		1,2,4-Trimethylbenzene	92	μg/L	<1	--	--	--	**Yes***
		1,3,5-Trimethylbenzene	52	μg/L	<1	--	--	--	**Yes***

* Chemicals without an RBSL or ARAR are considered chemicals of potential concern and are discussed in the Final Point Barrow Risk Assessment, Section 2.1.5 (U.S. Air Force 1996).
a Risk-Based Screening Level.
b Applicable or Relevant and Appropriate Requirement.
c ADEC 1991.
d MCL, 52 FR 25690.
e MCL, 56 FR 3526 (30 January 1991).
J [illegible]t is an estimate.

4.0 REMEDIAL INVESTIGATION - SITE REQUIRING FURTHER CHARACTERIZATION

This section of the RI/FS presents results from RI sampling and analysis activities for the one Point Barrow site, the Garage (SS02), where further characterization may be warranted. The information presented in this section includes site background, field sampling and analytical results, potential migration pathways, human health and ecological risk assessment summaries, and conclusions and recommendations. (Note: the figure and tables are presented at the end of the section.) The discussions in this section are intended to provide the reader with all information needed to understand the site conditions and make decisions regarding appropriate action for the site.

Photographs of the Point Barrow installation and the sites investigated during the RI are presented in Appendix B. Data tables in this section list analytical results from samples in which chemicals were detected above quantitation limits. Complete laboratory analytical data sheets for each sample, including quantitation limits for non-detected analytes, are presented in Appendix F.

4.1 GARAGE (SS02)

4.1.1 Site Background

The Garage (SS02) site is located west of module train A. The Garage is an approximately 90-foot by 40-foot building elevated about three feet above the tundra and is surrounded by gravel on the north, east, and south sides. The building is used for vehicle maintenance and storage. Floor drains in this building discharged directly to the tundra beneath the structure and may have received vehicle maintenance waste. The floor drains were sealed by the Air Force in July 1993 to prevent the possibility of future release of contaminants.

The site-specific environmental setting describing the topography, surface water drainage, and soil types is presented in the discussion of potential migration pathways, Section 4.1.3.

4.1.2 Field Sampling and Analytical Results

This section describes the RI sampling and analytical results for samples collected at the Garage (SS02) site. The discussion presents a review of laboratory data, data summary tables, contaminants identified, contaminant trends, and information on suspected source areas.

4.1.2.1 Summary of Samples Collected. A total of six samples was collected during the RI from gravel pads and drainage areas at the site. These consisted of five soil samples and one sediment sample. Table 2-2 presents a detailed summary of the samples collected and the analyses performed during the 1993 RI field activities. Locations of all samples collected at the Garage (SS02) site are presented in Figure 4-1.

Five soil samples were analyzed for DRPH and GRPH. In addition, four samples were analyzed for RRPH, BTEX, HVOCs, and PCBs. Two samples were analyzed for VOCs, and one sample was analyzed for SVOCs, pesticides, and total metals.

One sediment sample was analyzed for DRPH, GRPH, RRPH, BTEX, HVOCs, PCBs, and pesticides.

4.1.2.2 Analytical Results. The data summary table (Table 4-1) presents analytical results for all samples collected at the site. Detection and quantitation limits, action levels, associated laboratory and field blanks, and background analytical results are presented for each of the analyses. Background levels are listed to allow direct comparison of naturally occurring organic compounds and inorganic analytes with samples collected from the site. Sample locations and analytical results for the samples at the site are illustrated in Figure 4-1. All organic compounds detected are presented on the figure except when they were a result of laboratory contamination or decontamination procedures. Only metals detected above background levels that exceed an RBSL or an ARAR are presented on Figure 4-1. The exceptions are presented on the data summary table.

The following section presents a discussion of organic compounds and inorganic analytes detected above background levels at the site.

Organics. Organic compounds detected in soil and sediment samples at the site include DRPH, GRPH, RRPH, BTEX compounds, three other VOCs, and PCBs. DRPH were detected in three soil samples, ranging from 292 to 3,300 mg/kg. GRPH were detected in three soil samples ranging from 2 to 113 mg/kg (samples SS02-S01-1.5, SS02-S03-1, and SS02-2S06-2). RRPH were detected in three soil samples ranging from 240 to 710 mg/kg (samples SS02-S02, SS02-S03-1, and SS02-S04/S05). Total BTEX concentrations were 2.9 and 3.34 mg/kg in soil samples SS02-S01 and SS02-S03; xylenes were the primary component. Three other VOCs (trichloroethene, tetrachloroethene, and styrene) were detected at concentrations ranging from 0.187 to 0.6 mg/kg in soil samples SS02-S02 and SS02-S03. PCBs were detected in three soil samples at concentrations ranging from 3.7 to 14 mg/kg.

Inorganics. In soils, metals analyses indicated that two metals (lead and zinc) were detected above background levels at the site. Lead and zinc were detected at 150 and 270 mg/kg, respectively, in soil sample SS02-S02.

4.1.2.3 Summary of Site Contamination. The primary contaminants at the site are petroleum hydrocarbons (DRPH, GRPH, and RRPH), PCBs, BTEX and other VOCs commonly associated with diesel fuel. The suspected source of contaminants detected during sampling conducted at the Garage site is wastes discharged to the building floor drains; however, additional samples should be collected at the site in order to more fully characterize contaminant extent. The drains were sealed by the Air Force in 1993 to prevent further release of contaminants. No previous IRP sampling is known to have been conducted at the site. The human health and ecological risks associated with the chemicals detected at the site are presented in Sections 4.1.4 and 4.1.5.

4.1.3 Migration Pathways

This section describes the topography and stratigraphy of the site and the migration potential of contaminants from the site. A discussion of receptors and chemical concentrations at receptors is included.

4.1.3.1 Topography and Stratigraphy. The Garage is constructed on native tundra and is surrounded by an approximately three-feet-thick gravel pad on the north, east, and south sides. Except for the gravel pad, little topographic relief is expressed in this area. Drainage in the area is generally to the west and towards Imikpuk Lake. Drainage from beneath the Garage is to the tundra (mostly unsaturated during the investigation) located immediately to the west.

During the 1993 RI, permafrost was located at a depth of up to four feet under the gravel pads and at a depth of two feet under tundra areas. Gravel pads consisted of the typical gravels and sands associated with these features, and subsurface tundra materials were of the typical stratigraphy found at Point Barrow (Section 2.4.4.2).

4.1.3.2 Migration Potential.

Subsurface Migration. Analytical data indicate that the subsurface has been affected by site contaminants; however, the potential for contaminant migration in active layer water at this site is low. Site topography dictates that subsurface flow in this area should be to the west. The surface of the shallow drainage pathway leading west from the site was mainly unsaturated; however, small puddles in the drainage indicated areas where the water table was above the ground surface. A sediment sample collected from one of the puddles indicated analytes were not present, suggesting that areas immediately downgradient of the Garage have not been contaminated.

Surface Migration. The site topography indicates that surface water should drain to the shallow drainage feature leading west from the Garage. Although this feature was mostly unsaturated during the investigation, contaminant migration in surface water may occur during rain events or the spring thaw. Because no contaminants were detected in the downgradient sediment sample, the potential for surface migration is considered to be low.

Air Transport. Air transportation is not considered to be a significant mode of migration at the site (Section 2.4.4.5).

Summary of Migration Potential. Analytical data suggest that COCs are present in site soils, but that the downgradient migration is not occurring at this site. Based upon these results, the potential for contaminant migration from this site is considered to be low.

4.1.3.3 Receptors and Chemical Concentrations at Receptors.

Human Receptors. Potential human receptors at the Garage site include Air Force contractor personnel working at the station, visitors to the station, and an occasional local visitor passing the site to get to recreational or subsistence lands. Human receptors could potentially be

exposed to the chemicals detected in soil/sediments at the site. The primary routes of potential exposures at the site are direct contact with soil/sediment and incidental ingestion of soil/sediment. Surface water was not considered a route of exposure at the site because there were no surface water bodies associated with the site. Because ground water and air at the Point Barrow sites are not considered complete pathways of exposure, these media are not evaluated as potential pathways to human receptors.

The Point Barrow Risk Assessment (U.S. Air Force 1996) evaluates in detail the risks to human health from all COCs detected at the site. The potential receptor groups were selected based on their likelihood of exposure to contaminants at the site, and include DEW Line workers at the installation, and native adults and children who may visit the site. The estimated exposure point concentrations for human receptors are based on the maximum concentration of each chemical detected at the site. The potential risks to human health associated with chemicals at Point Barrow are presented in Section 3.2.4.

Ecological Receptors. Ecological receptors were evaluated in detail in the Point Barrow Risk Assessment (U.S. Air Force 1996) to determine if plants and animals could potentially be impacted by the chemicals detected at the Point Barrow installation. Because of the diversity of the plants and animals in the area of the Point Barrow installation, a set of representative species was selected in the ERA for detailed evaluation. The species include plants, aquatic invertebrates, fish, birds, and mammals. These receptors were selected based on the species' likelihood of exposure given their preferred habitat and feeding habits. The representative species encompass a range of ecological niches in order to achieve the best characterization of the ecosystems being examined and are presented in Table 2-6.

The estimate of chemical concentrations at the ecological receptors was based on the average site-wide concentration of each COC. This approach was appropriate because few of the representative species would inhabit only one distinct site at the installation; they are more likely to be exposed to the mix of chemicals and concentrations detected on all the sites at Point Barrow. The potential ecological risks associated with the chemicals detected at the site are presented in Section 4.1.5.

4.1.4 Human Health Risk Assessment

This section presents a summary of the potential human health risks associated with the chemicals detected at the Garage (SS02) site. The purpose of the human health risk assessment is to quantify the excess lifetime cancer risk and/or the noncancer hazard (reported as hazard index) from the chemicals detected at the site.

This summary presents the COCs at the site, the pathways by which human receptors may be exposed to site chemicals, potential risks to human health posed by each chemical through each exposure pathway, the significance of the risk and/or hazard estimate, and a comparison of site chemical concentrations to ARARs. The methods and assumptions used in calculating hazards and risks are presented in Section 2.4.1.

4.1.4.1 Chemicals of Concern. DRPH, GRPH, and PCBs (Aroclor 1254) were identified as COCs for the soil matrix at the Garage. The concentrations of DRPH and GRPH exceeded their background concentrations and the ARAR concentration for petroleum hydrocarbon contamination of soil (ADEC 1991). The concentration of Aroclor 1254 exceeded the background concentration and the RBSLs based on cancer risk and noncancer hazard. The RBSL for cancer risk was based on the cancer slope factor for PCBs. Although it is a member of the PCB family, Aroclor 1254 has not been assigned to an EPA carcinogen weight-of-evidence group.

No surface water bodies were identified at the Garage; therefore, no surface water COCs were identified.

Table 4-2, Identification of COCs at the Garage, presents the maximum concentrations of chemicals detected at the site, the associated background concentrations, RBSLs, and ARARs, and identifies COCs selected in the risk evaluation.

4.1.4.2 Exposure Pathways and Potential Receptors. Because no surface water bodies were associated with the Garage, only soil/sediment ingestion pathways were evaluated in the risk assessment.

Three potential receptor groups were evaluated in the risk assessment: an adult assigned to a DEW Line installation (worker), an adult inhabitant of communities in the North Slope of Alaska (native), and a child living in a North Slope community (child).

4.1.4.3 Risk Characterization.

Noncancer Hazard and Cancer Risk Associated with Soils and Sediments. The noncancer hazard associated with the ingestion of soil at the Garage by a hypothetical native northern adult/child is 0.9, and by a DEW Line worker is 0.04, based on the maximum concentrations of the COCs. The presence of DRPH, GRPH, and PCBs (Aroclor 1254) accounts entirely for the quantifiable noncancer hazard for these receptor/pathway combinations. Aroclor 1254 alone accounts for more than 99 percent of the noncancer hazard.

The excess lifetime cancer risk associated with the ingestion of soil/sediment at this site by a hypothetical native northern adult/child is 2×10^{-5}, and by a DEW Line worker is 9×10^{-7}, based on the maximum concentrations of the COCs. The presence of GRPH and Aroclor 1254 accounts entirely for the quantifiable cancer risk for these receptor/pathway combinations. Aroclor 1254 accounts for more than 90 percent of the quantifiable excess lifetime risk.

4.1.4.4 Summary of Human Health Risk Assessment. The potential risks and hazards associated with the soil/sediment at the Garage site are the low noncancer hazard (hazard indices of 0.9 and 0.04) and low cancer risk associated primarily with Aroclor 1254. These risks and hazards were calculated conservatively based on ingestion of soil at a rate associated with a residential scenario. It is very unlikely that the soil at this location would be ingested at the conservative rate used in the risk calculation, and the hazards and risks at the site are likely to be overestimated. Remedial action is generally not warranted at sites where the excess lifetime cancer risk is less than 1×10^{-4} and the noncancer hazards do not significantly

exceed one (EPA 1991b), and on the basis of the risk assessment remediation of the site is not necessarily warranted.

In conclusion, under current uses the COCs identified in soil at the Garage site pose only a minimal, if any, potential threat to human health. Based on the human health risk assessment, remedial actions are not warranted at the site.

4.1.5 Ecological Risk Assessment

The objective of the ecological risk assessment was to estimate the potential impacts of chemicals detected at the Point Barrow installation to aquatic and terrestrial plants and animals. A summary of the methods used to assess potential ecological impacts is presented in Section 2.4.2.

4.1.5.1 Chemicals of Concern. COCs were selected based on criteria presented in Section 3.1 of the ERA. The average installation-wide concentrations of COCs were used to calculate the risk estimates. All sites at the installation were considered as potentially usable habitat. It should be noted that the COC selection process only considered the soil/sediment samples that were at or less than 1.5 feet deep. The soil/sediment samples were screened for depth because it is unlikely that any of the representative species will be exposed to soils/sediments deeper than 1.5 feet. The COCs in soils/sediments at the Garage site were DRPH, GRPH, toluene, xylenes, PCBs (Aroclor 1254), lead, and zinc. None of the identified COCs were associated with significant ecological risk estimates under current conditions at the Garage site.

4.1.5.2 Summary of Ecological Risk Assessment. Based on the quantification of potential risks to ecological receptors and discussions presented in the Point Barrow ERA, ecological risks under current conditions at the Garage site are unlikely. Although PCB concentrations do not currently pose a significant risk, they may present a risk to ecological receptors in the future as a result of potential bioaccumulation if site conditions remain the same. The locations below the Garage where PCBs were detected are not likely to be suitable habitat for ecological receptors.

4.1.6 Conclusions and Recommendations

Sampling and analyses have determined that the Garage (SS02) site is contaminated with petroleum hydrocarbons (DRPH, GRPH, and RRPH), PCBs, BTEX compounds, and other VOCs that are components of diesel fuel. The contaminated area at the site is limited to soil under and around the Garage. The area beneath the Garage has the highest contaminant concentrations, which decrease with distance from the Garage. The suspected source of contamination is wastes discharged to the building floor drains. The drains were sealed in 1993 by the Air Force to prevent further release of contaminants.

The risk assessment concluded that risks posed to human health and ecological receptors by site contaminants are minimal given current site uses. The human health risk is not of a magnitude that normally requires remedial action. The ERA concluded that the overall potential

risks presented by site contaminants are minimal. Therefore, under current site conditions and considering the findings of the risk assessment, remediation of the site is not necessarily warranted.

Levels of petroleum compounds (DRPH, GRPH, and RRPH) and PCBs detected in soil at the site, however, slightly exceed ADEC guidance cleanup levels, but the extent of contamination is not clearly defined. Therefore, the site is being recommended for additional sampling in order to more fully characterize the extent of petroleum hydrocarbon and PCB contamination.

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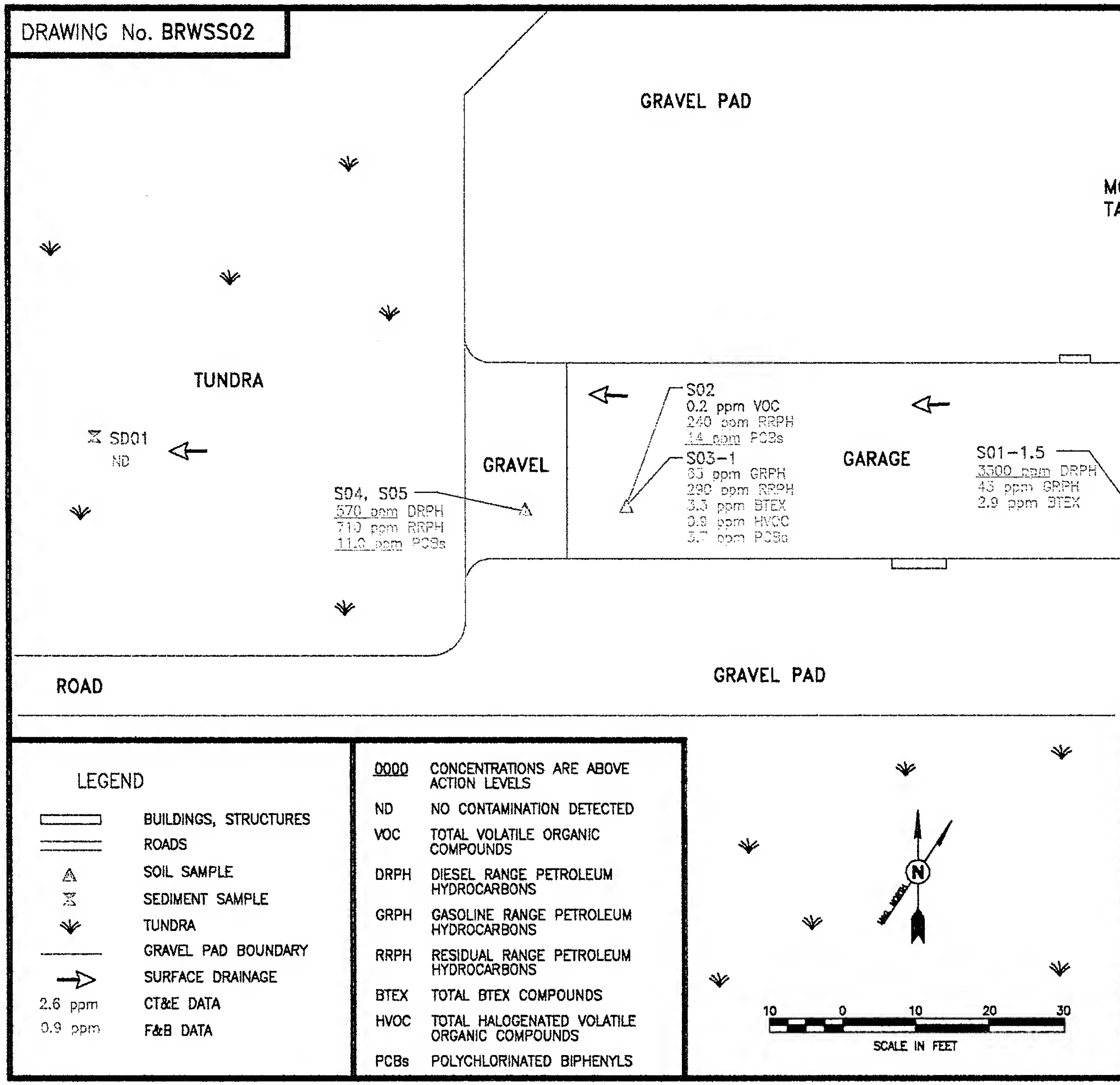

POINT BARROW RADAR INSTALLATION

USAF 611th CES

FIGURE NO. 4-1

GARAGE (SS02)
SAMPLE LOCATIONS
AND
ANALYTICAL RESULTS

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TABLE 4-1. GARAGE ANALYTICAL DATA SUMMARY

Installation: Point Barrow
Site: Garage (SS02)

Matrix: Soil/Sediment
Units: mg/kg

Parameters	Detect. Limits	Quant. Limits	Action Levels	Bkgd. Levels	Environmental Samples						Field Blanks			Lab Blanks	
					S01-1.5	S02	S03-1	S04 & S05 (Replicates)		SD01	AB01	EB01	TB02		
Laboratory Sample ID Numbers					1148	1150 4424-9	1152	1204	1206	1146	4395-2	1156 1158 4424-4	1154 4424-5	#5-9193 4424 4395	#5-83193 #1&2-9293 4424
ANALYSES	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/L	µg/L	µg/L	µg/L	mg/kg
DRPH	20	200	500[a]	<65J[b]-<180J[b]	3,300J[b]	<50J[b]	830R[bd]	570J[bd]	450J[bd]	<200[b]	NA	<1,000[b]	NA	<200	<50
GRPH	0.1	1	100	<3J[b]-<7J[b]	113J[b]	<1J[b]	63J[b]	<1J[b]	<1J[b]	<1J[b]	NA	<100J[b]	<100[b]	NA	<1
RRPH (Approx.)	10-40	100-400	2,000[a]	<130-<360	<100	240	290	710	690	<400	NA	<2,000	NA	<2,000	<100
BTEX (8020/8020 Mod.)			10 Total BTEX	<0.14-<0.31	8.8J	<0.10	3.34J	<0.10	<0.10	<0.44					
Benzene	0.002-0.008	0.02-0.08	0.5	<0.03-<0.07	<0.02	<0.02	<0.02	<0.02	<0.02	<0.08	<1[c]	<1	<1	<1	<0.02
Toluene	0.002-0.008	0.02-0.08		<0.03-<0.07	1.3	<0.02	0.04	<0.02	<0.02	<0.08	<1[c]	<1	<1	<1	<0.02
Ethylbenzene	0.002-0.008	0.02-0.08		<0.03-<0.07	0.4	<0.02	0.9	<0.02	<0.02	<0.08	<1[c]	<1	<1	<1	<0.02-<0.03
Xylenes (Total)	0.004-0.02	0.04-0.2		<0.05-<0.1	6.9J	<0.04	2.4J	<0.04	<0.04	<0.2	<2[c]	<2	<2	<2	<0.04-<0.09
HVOC 8010															
Tetrachloroethene	0.002-0.008	0.02-0.08		<0.03-<0.07	<0.02	<0.02	0.3	<0.02	<0.02	<0.08	NA	<1	<1	<1	<0.02
Trichloroethene	0.002-0.008	0.02-0.08		<0.03-<0.07	<0.02	<0.02	0.6	<0.02	<0.02	<0.08	NA	<1	<1	<1	<0.02
VOC 8260															
Styrene	0.020	0.020		<0.050J	NA	0.187	NA	NA	NA	NA	<1	NA	<1	<1	<0.020
SVOC 8270	0.200	2.10		<3.80-<40	NA	<2.10	NA	NA	NA	NA	NA	NA	NA	NA	<0.200
PCBs															
Aroclor 1254	0.01	0.1	10	<0.4J	<0.1	14	3.7J	11.0J	10.4J	<0.1	NA	<2	NA	NA	<0.1

☐ CT&E Data.
▩ F&B Data.
NA Not analyzed.
J Result is an estimate.
R Result has been rejected.
a The action levels for DRPH and RRPH are based on conversations with ADEC; final action levels have not yet been determined.
b DRPH and GRPH concentrations reported for these samples are equivalent to diesel and gasoline range organics (DRO and GRO) as defined by ADEC.
c BTEX determined by 8260 method analysis.
d The laboratory reported that the sample contained high lube oil or cutting oil.

TABLE 4-1. GARAGE ANALYTICAL DATA SUMMARY (CONTINUED)

Installation: Point Barrow
Site: Garage (SS02)
Matrix: Soil/Sediment
Units: mg/kg

Parameters	Detect. Limits	Quant. Limits	Action Levels	Bkgd. Levels	Environmental Samples						Field Blanks			Lab Blanks	
					S01-1.5	S02	S03-1	S04 & S05 (Replicates)		SD01	AB01	EB01	TB02		
Laboratory Sample ID Numbers					1148	1150 4424-9	1152	1204	1206	1146	4395-2	1156 1158 4424-4	1154 4424-5	#5-9193 4424 4395	#5-83193 #1&2-9283 4424
ANALYSES	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/L	µg/L	µg/L	µg/L	mg/kg
Pesticides	0.001-0.05	0.01-0.5		<0.01J-<1.8J	<0.01-<0.5R	NA	NA	NA	NA	<0.01-<0.5R	NA	<0.2J-<25R	NA	NA	NA

☐ CT&E Data.
NA Not analyzed.
J Result is an estimate.
R Result has been rejected.

TABLE 4-1. GARAGE ANALYTICAL DATA SUMMARY (CONTINUED)

Installation: Point Barrow Site: Garage (SS02)		Matrix: Soil Units: mg/kg										
Parameters	Detect. Limits	Quant. Limits	Action Levels	Bkgd. Levels	Environmental Sample			Field Blanks			Lab Blanks	
					2S06-2			AB01	2EB03	2TB03		
Laboratory Sample ID Numbers					4627-1			4395-2	4827-23	4627-22	4627 4395	4627
ANALYSES	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg			µg/L	µg/L	µg/L	µg/L	mg/kg
DRPH	4.00	4.00	500[a]	<65J[b]-<180J[b]	292			NA	NA	NA	NA	<4.00
GRPH	0.400	0.400	100	<3J[b]-<7J[b]	2.05			NA	<20	NA	<20	<0.400
VOC 8260	0.020	0.020		<0.050J	<0.020J			<1	<1	<1	<1	<1

☐ CT&E Data.
▩ F&B Data.
NA Not analyzed.
J Result is an estimate.
a The action level for DRPH is based on conversations with ADEC; a final action level has not yet been determined.
b DRPH and GRPH concentrations reported for these samples are equivalent to diesel and gasoline range organics (DRO and GRO) as defined by ADEC.

TABLE 4-1. GARAGE ANALYTICAL DATA SUMMARY (CONTINUED)

Installation: Point Barrow
Site: Garage (SS02)

Matrix: Soil
Units: mg/kg

METALS ANALYSES

Parameters	Detect. Limits	Quant. Limits	Action Levels	Bkgd. Range from 7 DEW Line Installations	Environmental Sample							Field Blank			Lab Blank
					S02								EB01		
Laboratory Sample ID Numbers					4424-9								4424-4		4424
ANALYSES	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg								µg/L		µg/L
Aluminum	0.35	2		1,500-23,000	1,000								<100		<100
Antimony	N/A	51		<7.8-<230	<51								<100		<100
Arsenic	0.11	51		<4.9-7.0	<51								<100		<100
Barium	0.024	1		27-390	110								<50		<50
Beryllium	N/A	2.6		<2.6-6.4	<2.6								<50		<50
Cadmium	0.33	1		<3.0-<27	3.9								<50		<50
Calcium	0.69	4		360-59,000	1,200								220		<200
Chromium	0.066	1		<4.3-47	31								<50		<50
Cobalt	N/A	5.1		<5.1-12	<5.1								<50		<100
Copper	0.045	1		<2.7-45	20								<50		<50
Iron	0.50	2		5,400-35,000	7,600								<100		<100
Lead	0.13	2		<5.1-22	150								<100		<100
Magnesium	0.96	4		360-7,400	650								<200		<200
Manganese	0.025	1		25-290	45								<50		<50
Molybdenum	N/A	2.6		<2.5-<11	<2.6								<50		<50
Nickel	0.11	1		4.2-46	5.2								<50		<50
Potassium	23	100		<300-2,200	350								<5,000		<5,000
Selenium	1.2	51		<7.8-<170	<51								<100		<100

☐ CT&E Data.
N/A Not available.

TABLE 4-1. GARAGE ANALYTICAL DATA SUMMARY (CONTINUED)

Installation: Point Barrow
Site: Garage (SS02)

Matrix: Soil
Units: mg/kg

METALS ANALYSES

Parameters	Detect. Limits	Quant. Limits	Action Levels	Bkgd. Range from 7 DEW Line Installations	Environmental Sample							Field Blank			Lab Blank
					S02								EB01		
Laboratory Sample ID Numbers					4424-9								4424-4		4424
ANALYSES	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg								µg/L		µg/L
Silver	0.53	2.6		<3-<110	<2.6								<50		<50
Sodium	0.55	5		<160-680	100								<250		<250
Thallium	0.011	0.24		<0.2-<0.82	<0.24								<5		<5
Vanadium	0.036	1		6.3-59	8.1								<50		<50
Zinc	0.16	1		9.2-95	270								<50		<50

☐ CT&E Data.

TABLE 4-2. IDENTIFICATION OF CHEMICALS OF CONCERN AT THE GARAGE (SS02)

SITE	MATRIX	CHEMICAL DETECTED	MAXIMUM CONCENTRATION	UNITS	BACKGROUND RANGE	RBSL[a]		ARAR[b]	CHEMICAL OF CONCERN
						CANCER	NON-CANCER		
Garage	Soil	DRPH	3,300J	mg/kg	<65J-<180J	--	--	500[c]	**Yes**
(SS02)		GRPH	113J	mg/kg	<3J-<7J	--	--	100[c]	**Yes**
		RRPH	710	mg/kg	<130-<360	--	--	2,000[c]	No
		Toluene	1.3	mg/kg	<0.03-<0.07	--	5,400	--	No
		Ethylbenzene	0.9	mg/kg	<0.03-<0.07	--	2,700	--	No
		Xylenes (Total)	6.9J	mg/kg	<0.05-<0.1	--	54,000	--	No
		Tetrachloroethene	0.3	mg/kg	<0.03-<0.07	1.23	270	--	No
		Trichloroethene	0.6	mg/kg	<0.03-<0.07	5.8	--	--	No
		Styrene	0.187	mg/kg	<0.050J	--	--	--	***Yes**
		Aroclor 1254	14	mg/kg	<0.4J	--	0.54	10[d]	**Yes**
		Aluminum	1,000	mg/kg	1,500-23,000	--	--	--	No
		Barium	110	mg/kg	27-390	--	1,890	--	No
		Cadmium	3.9	mg/kg	<3.0-<27	--	27	--	No
		Calcium	1,200	mg/kg	360-59,000	--	--	--	No
		Chromium	31	mg/kg	<4.3-47	--	135	--	No
		Copper	20	mg/kg	<2.7-45	--	999	--	No
		Iron	7,600	mg/kg	5,400-35,000	--	--	--	No
		Lead	150	mg/kg	<5.1-22	--	--	500[e]	No
		Magnesium	650	mg/kg	360-7,400	--	--	--	No
		Manganese	45	mg/kg	25-290	--	3,780	--	No
		Nickel	5.2	mg/kg	4.2-46	--	540	--	No
		Potassium	350	mg/kg	<300-2,200	--	--	--	No
		Sodium	100	mg/kg	<160-680	--	--	--	No

TABLE 4-2. IDENTIFICATION OF CHEMICALS OF CONCERN AT THE GARAGE (SS02) (CONTINUED)

SITE	MATRIX	CHEMICAL DETECTED	MAXIMUM CONCENTRATION	UNITS	BACKGROUND RANGE	RBSL[a]		ARAR[b]	CHEMICAL OF CONCERN
						CANCER	NON-CANCER		
Garage	Soil	Vanadium	8.1	mg/kg	6.3-59	--	189	--	No
(Continued)	(Continued)	Zinc	270	mg/kg	9.2-95	--	8,100	--	No

* Chemicals without an RBSL or ARAR are considered chemicals of potential concern and are discussed in the Final Point Barrow Risk Assessment, Section 2.1.5 (U.S. Air Force 1996).
a Risk-Based Screening Level.
b Applicable or Relevant and Appropriate Requirement.
c ADEC 1991.
d TSCA Cleanup Level.
e EPA 1991c.
J Result is an estimate.

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5.0 REMEDIAL INVESTIGATION - REMEDIAL ACTION SITES

This section of the RI/FS presents results from RI sampling and analysis activities for the one Point Barrow site, the Air Terminal Area (SS03), where remedial action may be warranted. The information in this section includes site background, field sampling and analytical results, potential migration pathways, human health and ecological risk assessment summaries, and conclusions and recommendations. (Note: the figure and tables are presented at the end of the section.) The discussions in this section are intended to provide the reader with all information needed to understand the site conditions and make decisions regarding appropriate action for the site.

Photographs of the Point Barrow installation and the sites investigated during the RI are presented in Appendix B. Data tables in this section list analytical results from samples in which chemicals were detected above quantitation limits. Complete laboratory analytical data sheets for each sample, including quantitation limits for non-detected analytes, are presented in Appendix F.

5.1 AIR TERMINAL AREA (SS03)

5.1.1 Site Background

This large area is located north-northwest of the main station facilities, around the air terminal building. The site consists of an expanse of gravel pads and roads that effectively berm off several wet tundra areas, a hangar, air terminal building, and several fuel storage tanks (JP-4 and diesel). Four fuel spills have been reported by a previous Navy contractor in areas just to the west of the site. The first occurred in August 1976 and consisted of an underground pipe failure that discharged an estimated 48,000 gallons of gasoline. The second and third reported spills occurred in 1978 and involved approximately 24,700 gallons of JP-5 (jet fuel) and 277,463 gallons of gasoline, respectively. A fourth spill of unknown quantity occurred in 1986 (Shannon and Wilson 1992).

It is suspected that Navy activities may have led to the contamination of the site. Previous sampling and analysis, conducted in 1992, detected GRPH and BTEX in soil and BTEX and 1,2-dichloroethane in surface water at the site (Shannon and Wilson 1992).

The site-specific environmental setting describing the topography, surface water drainage, and soil types is presented in the discussion of potential migration pathways, Section 5.1.3.

5.1.2 Field Sampling and Analytical Results

This section describes the RI sampling and analytical results for samples collected at the Air Terminal Area (SS03) site. The discussion presents a review of laboratory data, data summary tables, contaminants identified, contaminant trends, and information on suspected source areas.

5.1.2.1 Summary of Samples Collected. A total of 26 samples was collected at the site. These consisted of 10 soil, nine sediment, and seven surface water samples. Table 2-2 presents a detailed summary of the samples collected and the analyses performed during the 1993 RI field activities. Locations of all samples collected at the Air Terminal Area (SS03) site are presented in Figure 5-1.

The ten soil samples were analyzed for DRPH and GRPH. In addition, six soil samples were analyzed for RRPH, BTEX, and HVOCs. Four soil samples were analyzed for VOCs, and one soil sample was analyzed for SVOCs, total metals, and TOC.

Nine sediment samples were analyzed for DRPH. In addition, eight samples were analyzed for GRPH and BTEX. Seven samples were analyzed for RRPH and PCBs, and six samples were analyzed for HVOCs. One sediment sample was analyzed for pesticides, SVOCs, TOC, and total metals.

Seven surface water samples were analyzed for DRPH, GRPH, RRPH, BTEX, HVOCs, and PCBs. In addition, two water samples were analyzed for VOCs, SVOCs, total and dissolved metals, TOC, TSS, and TDS.

5.1.2.2 Analytical Results. The data summary table (Table 5-1) presents analytical results for all samples collected at the site. Detection and quantitation limits, action levels, associated laboratory and field blanks, and background analytical results are presented for each of the analyses. Background levels are listed to allow direct comparison of naturally occurring organic compounds with samples collected from the site. Sample locations and analytical results for the samples at the site are illustrated in Figure 5-1. All organic compounds detected are presented on the figure except when they were a result of laboratory contamination or field decontamination procedures. Only metals detected above background levels that exceeded an RBSL or ARAR are presented on Figure 5-1. The exceptions are presented on the data summary table.

The following section presents a discussion of organic compounds and inorganic analytes detected above background levels at the site. A discussion of TDS, TSS, and TOC is included.

Organics. Organic compounds detected in soil and sediment samples collected at the site include DRPH, GRPH, RRPH, BTEX compounds, and two SVOCs. DRPH were detected in 11 samples ranging from 7.21 to 11,000 mg/kg; it was reported that the chromatograph patterns for environmental petroleum hydrocarbons in six of these samples were not consistent with those for a middle distillate fuel. GRPH were detected in eight samples at concentrations ranging from 0.8 to 1,200 mg/kg. RRPH were detected in one sediment sample, SS03-SD08, at 120 mg/kg. Total BTEX was detected in eight samples at 0.046 to 8.3 mg/kg; xylenes were the primary component. Two SVOCs, naphthalene and 2-methylnaphthalene, were detected at very low concentrations (1.87 and 2.58 mg/kg, respectively) in sediment sample SS03-SD07; both are common components of diesel fuel.

In surface water samples, organic compounds detected include GRPH, BTEX, and four other VOCs. GRPH were detected in three samples at concentrations ranging from 136 to 1,126 µg/L.

BTEX compounds were detected in five surface water samples at concentrations ranging from 4.8 to 280 µg/L. Xylenes were the primary component (280 µg/L); however, benzene was detected in two samples at concentrations of 16 and 83 µg/L (samples SS03-SW07 and SS03-SW05, respectively). Four other VOCs were detected in two surface water samples (SS03-SW04/SW08 and SS03-SW07). Three of the VOCs detected are common components of diesel fuel (naphthalene, 1.1 and 4.2 µg/L; 1,2,4-trimethylbenzene, 2.7 and 8.9 µg/L; and 1,3,5-trimethylbenzene 3.4 and 3.5 µg/L).

In addition, one VOC was detected in a surface water sample was detected at similar concentrations in the background samples. This compound, 1,2-dichloroethane was detected at 1.6 µg/L in the environmental samples and 1.2 µg/L in the background sample. These detections are assumed to be the result of field decontamination procedures. The hexane and methanol used in the decontamination procedures may have contained impurities including 1,2-dichloroethane.

Inorganics. Metals analyses indicated that one metal (lead) was detected at concentrations above background levels in two sediment samples at this site. Lead was detected at 47 and 140 mg/kg in sediment samples SS03-SD08 and SS03-SD07, respectively.

In surface water samples, metals analyses detected three metals (barium, iron, and potassium) at levels above background concentrations. Barium was detected at 120 µg/L in surface water sample SS03-SW08. Iron was detected at concentrations of 3,100 and 6,000 µg/L in surface water samples SS03-SW04 and SS03-SW07, and potassium concentrations ranged from 5,900 µg/L to 10,000 µg/L in surface water samples SS03-SW04, SS03-SW07, and SS03-SW08.

TOC was reported at 1,380, and 5,160 mg/kg in soil and sediment samples SS03-S04-4 and SS03-SD07/SD08, respectively. TOC was reported at 17,200, and 33,500 µg/L in surface water samples SS03-SW04/SW08 and SS03-SW07, respectively. TSS were reported at 12,000 and 16,000 µg/L, and TDS were reported at 677,000 and 895,000 µg/L in samples SS03-SW04/SW08, and SS03-SW07, respectively.

5.1.2.3 Summary of Site Contamination. Previous sampling conducted at the Air Terminal Area (SS03) detected GRPH and BTEX in the soil, and GRPH, BTEX, and 1,2-dichloroethane in the surface water at the site. The results and sources of previous sampling efforts are presented in the RI/FS Work Plan (U.S. Air Force 1993a). The quality of the previous IRP sampling data is unknown as is the data validation, if any, that these data have undergone.

During previous sampling conducted by a Navy contractor in 1992, GRPH and BTEX were detected in a soil sample at 2,600 and 16 mg/kg, respectively. In the previous water sample collected, GRPH were detected at 4,200 µg/L, and 1,2-dichloroethane was detected at 127 µg/L. BTEX were detected in the water sample ranging from 178 to 11,800 µg/L; toluene and benzene were the primary components at concentrations of 11,800 and 9,390 µg/L, respectively.

A comparison of historical data and current project data indicates that there is a lower concentration of GRPH, BTEX, and 1,2-dichloroethane in soil and surface water than there has been in the past. Compounds detected in soil during the 1993 RI include DRPH (2.71 to

11,000 mg/kg), GRPH (0.8 to 1,200 mg/kg), RRPH (120 mg/kg), BTEX (0.046 to 8.3 mg/kg), and SVOCs (1.87 to 2,58 mg/kg). Compounds detected in surface water during the 1993 RI include GRPH (136 to 1,126 μg/L), BTEX (4.8 to 280 μg/L), and four other VOCs (1.1 to 8.9 μg/L). Differences between past and current data are likely to be a result of more extensive sampling during the 1993 RI. The human health and ecological risks associated with chemicals detected at the site are presented in Section 5.1.4 and 5.1.5. The suspected source of contaminants detected during sampling conducted at the Air Terminal Area is fuel spills and/or leaks from the four previously reported spills.

Based on field data, source of contamination, and concentration of contaminants, the contaminated area at the site is approximately 326,500 square feet of tundra.

5.1.3 Migration Pathways

This section describes the topography and stratigraphy of the site and the migration potential of contaminants from the site. A discussion of receptors and chemical concentrations at receptors is included.

5.1.3.1 Topography and Stratigraphy. The site consists of tundra areas and gravel pads and roads placed on the tundra (Figure 5-1), upon which buildings and JP-4 storage tanks have been constructed. The topography in this area is generally flat. The gravel pads and roads, which are approximately four feet thick, provide the greatest topographic relief at the site and berm several tundra areas. There is a slight slope on the east portion of the site towards North Salt Lagoon. A beach is located along portions of the lagoon. This site is bordered to the east by the North Salt Lagoon, and to the west by property that belongs to the Unkveagvik Inupiat Corporation; however, the Navy previously owned this property. Drainage in the area is generally towards the North Salt Lagoon; drainage from the west and south portions of the site is first routed to the south by a system of culverts and roads before flowing towards the North Salt Lagoon.

During the 1993 RI, permafrost was located at a depth of approximately two feet in tundra areas and four feet under gravel pads. Gravel pads consisted of the typical gravels and sands associated with these features, and subsurface tundra materials were of the typical stratigraphy associated with these features (Section 2.4.4.2). Along the beach subsurface materials consisted of the typical sands, gravels, and fine materials associated with these features.

5.1.3.2 Migration Potential.

Subsurface Migration. The presence of roads and gravel pads throughout the west and south portions of the site should affect the flow of active layer water. These features may act as subsurface "dikes", damming subsurface water in some areas (Figure 2-6). In these areas, water accumulates until the water table is higher than the ground surface, resulting in ponded areas. These ponded areas are drained through a system of culverts; flow in these areas may, therefore, be a function of surface water rather than active layer water. The presence of a plastic sheeting barrier in southeast portion of the site may further complicate an understanding of the flow regime. The plastic sheeting appeared to be designed to prevent the flow of active layer water

from the southeast portion of the site to North Salt Lagoon. Because further details concerning this barrier are not known, its effect upon subsurface flow in the active layer is difficult to assess.

Ponded areas in the northeast portion of the site provide a clearer indication of subsurface migration, which is to the east. A surface water sample from one of these ponds indicated the presence of BTEX and other VOCs commonly associated with gasoline and diesel fuels. The amount of subsurface flow occurring through this portion of the site should be restricted (the upgradient source area in this vicinity is limited by the presence of the gravel pad, and there is a relatively minor topographic gradient with which to drive the flow of active layer water), so subsurface migration potential is considered low. Contaminants were not detected in the subsurface soils in this portion of the site.

Surface Migration. The topography at the site dictates that drainage should be toward the east, into North Salt Lagoon. Drainage throughout much of the site is controlled by roads and culverts. There are no distinct streams or drainages entering the lagoon. The lack of drainage features entering the lagoon indicate that surface water can enter only by infiltration into the active layer (subsurface flow), or by overland flow when sufficient water is present. An abundant supply of water may be available during the spring thaw, when melting snow and ice provide more water than can infiltrate into the soil; at these times surface water features may drain overland into the lagoon (without the need for drainage features). Analytical data indicate surface water, soil, and sediment in some areas of the site contain DRPH, GRPH, and BTEX, and that there is a potential for the contaminants to migrate in surface water pathways.

Air Transport. Air transportation is not considered to be a significant mode of migration at the site (Section 2.4.4.5).

Summary of Migration Potential. Site conditions and analytical results indicate there is a potential for contaminants to enter North Salt Lagoon by infiltration into the active layer or by overland flow during the spring thaw. The amount of surface and subsurface flow, however, is restricted by the minor topographic relief, absence of significant upland source areas, and presence of roads and plastic barriers. The potential for contaminated surface water to enter the lagoon is significant only during the spring, when the abundant supply of meltwater may result in overland flow conditions. The direction of overland flow is affected by the numerous roads, gravel pads, and culverts in the area.

5.1.3.3 Receptors and Chemical Concentrations at Receptors.

Human Receptors. Potential human receptors at the Air Terminal Area (SS03) site include Air Force contractor personnel working at the station, visitors to the station, and an occasional local visitor passing the site to get to recreational or subsistence lands. Human receptors could potentially be exposed to the chemicals detected in surface water and soil/sediments at the site. The primary routes of potential exposures at the site are direct contact with, and incidental ingestion of, soil/sediment and ingestion of surface water. Because ground water and air at the Point Barrow sites are not considered complete pathways of exposure, these media are not evaluated as potential pathways to human receptors.

The Point Barrow Risk Assessment (U.S. Air Force 1996) evaluates in detail the risks to human health from all COCs detected at the site. The potential receptor groups were selected based on their likelihood of exposure to contaminants at the site and include DEW Line workers at the installation, and native adults and children who may visit the site. The estimated exposure point concentrations for human receptors are based on the maximum concentration of each chemical detected at the site. The potential risks to human health associated with chemicals at the site are presented in Section 5.1.4.

Ecological Receptors. Ecological receptors were evaluated in detail in the Point Barrow Risk Assessment (U.S. Air Force 1996) to determine if plants and animals could potentially be impacted by the chemicals detected at the Point Barrow installation. Because of the diversity of the plants and animals in the area of the Point Barrow installation, a set of representative species was selected in the ERA for detailed evaluation. The species include plants, aquatic invertebrates, fish, birds, and mammals. These receptors were selected based on the species' likelihood of exposure given their preferred habitat and feeding habits. The representative species encompass a range of ecological niches in order to achieve the best characterization of the ecosystems being examined and are presented in Table 2-6.

The estimate of chemical concentrations at the ecological receptors was based on the average site-wide concentration of each COC. This approach was appropriate because few of the representative species would inhabit only one distinct site at the installation; they are more likely to be exposed to the mix of chemicals and concentrations detected on all the sites at Point Barrow. The potential ecological risks associated with the chemicals detected at the site are presented in Section 5.1.5.

5.1.4 Human Health Risk Assessment

This section presents a summary of the potential human health risks associated with the chemicals detected at the Air Terminal Area (SS03) site. The purpose of the human health risk assessment is to quantify the excess lifetime cancer risk and/or the noncancer hazard (reported as hazard index) from the contaminants detected at the site.

This summary presents the COCs at the site, the pathways by which human receptors may be exposed to site chemicals, potential risks to human health posed by each chemical through each exposure pathway evaluated, the significance of the risk and/or hazard estimate, and a comparison of site chemical concentrations to ARARs. The methods and assumptions used in calculating hazards and risks are presented in Section 2.4.1.

5.1.4.1 Chemicals of Concern. DRPH, GRPH, and arsenic were identified as COCs for the soil matrix at the Air Terminal Area. The maximum concentrations of DRPH and GRPH exceeded their background concentrations and the ARAR concentrations for petroleum hydrocarbon contamination of soil (ADEC 1991). The maximum concentration of arsenic exceeded the background concentration and the RBSLs based on cancer risk and noncancer hazard.

GRPH and benzene were identified as COCs for the surface water matrix at the site. The maximum concentrations of GRPH and benzene exceeded their background concentrations and the RBSLs based on cancer. In addition, GRPH exceeded the RBSL based on noncancer, and benzene exceeded the ARAR, which is an MCL promulgated under the federal Safe Drinking Water Act.

Table 5-2, Identification of COCs at the Air Terminal Area (SS03), presents the maximum concentrations of chemicals detected at the site, the associated background concentrations, RBSLs, and ARARs, and identifies COCs selected in the risk evaluation.

5.1.4.2 Exposure Pathways and Potential Receptors. Because COCs were identified for soil/sediment and surface water at the site, the potential risks associated with ingestion of soil/sediment and surface water were evaluated in the risk assessment.

Three potential receptor groups were evaluated in the risk assessment: an adult assigned to a DEW Line installation (worker), an adult inhabitant of communities in the North Slope of Alaska (native), and a child living in a North Slope community (child).

5.1.4.3 Risk Characterization.

Noncancer Hazard and Cancer Risk Associated with Soils and Sediments. The noncancer hazard associated with the ingestion of soil at the Air Terminal Area by a hypothetical native northern adult/child is 0.2, and by a DEW Line worker is 0.01, based on the maximum concentrations of the COCs. The presence of DRPH, GRPH, and arsenic accounts entirely for the quantifiable noncancer hazard for these receptor/pathway combinations. DRPH alone accounts for approximately 80 percent of the noncancer hazard.

The excess lifetime cancer risk associated with the ingestion of soil or sediment at the site by a hypothetical native northern adult/child is 3×10^{-6}, and by a DEW Line worker is 2×10^{-7}, based on the maximum concentration of the carcinogenic COC. The presence of GRPH and arsenic accounts entirely for the quantifiable excess lifetime cancer risk for these receptor/pathway combinations. Arsenic alone accounts for more than 90 percent of the cancer risk.

Noncancer Hazard and Cancer Risk Associated with Surface Water. The noncancer hazard associated with the ingestion of surface water at the Air Terminal Area (SS03) site by a hypothetical native northern adult or by a DEW Line worker is 0.08, based on the maximum concentrations of the COCs. GRPH accounts entirely for the quantifiable noncancer hazard for these receptor/pathway combinations.

The excess lifetime cancer risk associated with the ingestion of surface water at this site by a native northern adult is 6×10^{-5}, and by a DEW Line worker is 9×10^{-6}, based on the maximum concentrations of the COC. The presence of GRPH and benzene accounts entirely for the quantifiable excess lifetime cancer risk for these receptor/pathway combinations.

Summary of Human Health Risk Assessment. The potential risks and hazards associated with the soil/sediment at the Air Terminal Area are the low noncancer hazard (hazard indices of 0.2

and 0.01) and the very low cancer risk associated with GRPH and arsenic. These risks and hazards were calculated conservatively based on ingestion of soil at a rate associated with a residential scenario. It is very unlikely that the soil at this location would be ingested at the conservative rate used in the risk calculation, and the hazards and risks at the site are likely to be overestimated. Remedial action is generally not warranted at sites where the excess lifetime cancer risk is less than 1 x 10^{-4} and the noncancer hazards do not significantly exceed one (EPA 1991b), and on the basis of the risk assessment remediation of the site is not warranted.

The potential risks and hazards associated with the surface water at the Air Terminal Area (SS03) are the very low noncancer hazard (hazard index of 0.08), and very low cancer risk associated with the GRPH and benzene. Remedial action is generally not warranted at sites where the excess lifetime cancer risk is less than 1 x 10^{-4} and the noncancer hazards do not significantly exceed one (EPA 1991b), and on the basis of the risk assessment remediation of the site is not warranted. In addition, the potential risks and hazards were calculated assuming the affected surface water would be used as a sole-source water supply for 180 days per year. Based on site-specific information, the chemicals in surface water do not currently pose a health hazard nor are they likely to pose a hazard in the future. The surface water expressions at the site are frozen most of the year; many are only intermittently filled with water during the summer months. The surface water at the site is not known to be used as a water supply now, nor has it been used in the past. In the unlikely event that surface water at the site is used as a sole-source drinking water supply in the future, a potential noncancer hazard to human health could exist if conditions remain constant.

In conclusion, under current or future site uses, the COCs identified in soil/sediment and surface water at the Air Terminal Area (SS03) site pose only a minimal, if any, potential threat to human health. The cancer risks and noncancer hazards calculated for soil/sediment and surface water at the site are below levels at which remediation is usually required. Based on the human health risk assessment, remedial actions are not warranted at the site.

5.1.5 Ecological Risk Assessment

The objective of the ecological risk assessment was to estimate the potential impacts of chemicals detected at the Point Barrow installation to aquatic and terrestrial plants and animals. A summary of the methods used to assess potential ecological impacts is presented in Section 2.4.2.

5.1.5.1 Chemicals of Concern. COCs were selected based on criteria presented in Section 3.1 of the ERA. The average installation-wide concentrations of COCs were used to calculate the risk estimates. All sites at the installation were considered as potentially usable habitat. It should be noted that the COC selection process only considered the soil/sediment samples that were at or less than 1.5 feet deep. The soil/sediment samples were screened for depth because it is unlikely that any of the representative species will be exposed to soils/sediments deeper than 1.5 feet. Iron and GRPH were identified as COCs in surface water, and the COCs in soils/sediments at the Air Terminal Area site were DRPH, GRPH, xylenes, and lead. None of the identified COCs were associated with significant ecological risk estimates at the Air Terminal Area site.

5.1.5.1 Summary of Ecological Risk Assessment. Based on the quantification of potential risks to ecological receptors and discussions presented in the Point Barrow ERA, ecological risks at the Air Terminal Area site are minimal.

5.1.6 Conclusions and Recommendations

Sampling and analyses have determined that the Air Terminal Area (SS03) site is contaminated with petroleum hydrocarbons (DRPH, GRPH, RRPH, and BTEX and other VOCs that are primarily associated with gasoline and diesel fuels). The affected area at the site is the tundra and surface water primarily in the south section of the site.

The risk assessment concluded that risks posed to human health and ecological receptors by site contaminants are minimal given current site uses. The potential human health risks at the site are not of a magnitude that normally requires remedial action. The ERA concluded that the overall potential risks presented by site contaminants are low. Therefore, under current or future site conditions and considering the findings of the risk assessment, remediation of the site is not necessarily warranted.

Levels of DRPH and GRPH detected in tundra and surface water at the site exceed ADEC guidance cleanup levels. Therefore, the site is being recommended for remedial action. The affected area at the site is approximately 30,000 cubic yards of tundra adjacent to and between the gravel pads and roads. The remedial action alternative recommended for the site is enhanced bioremediation. A complete description and evaluation of the remedial alternatives considered for this site are presented in the FS, Section 6.0.

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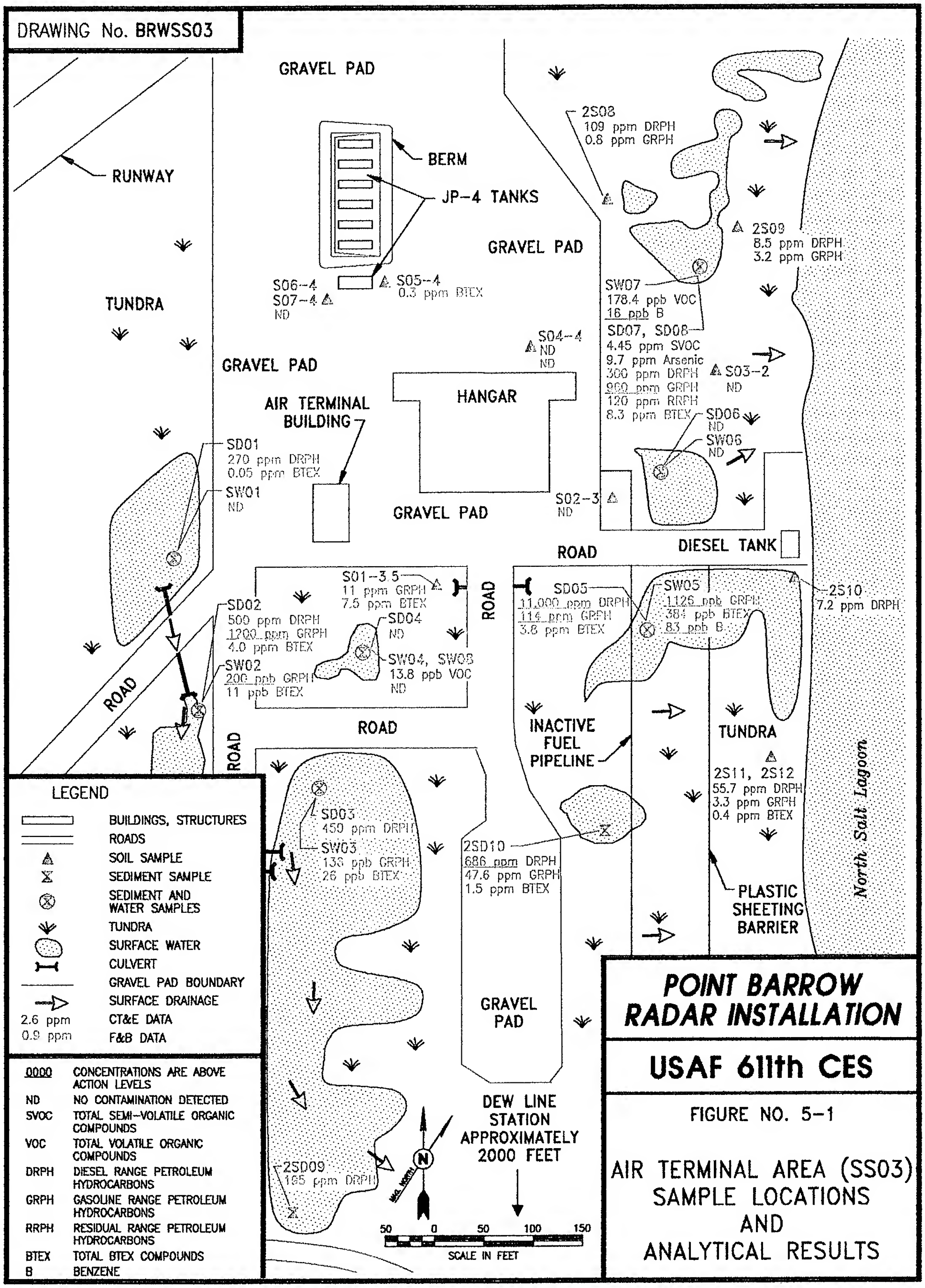

DRAWING No. BRWSS03
GRAVEL PAD
RUNWAY
BERM
JP-4 TANKS
GRAVEL PAD
TUNDRA
S06-4
S07-4
ND
S05-4
0.3 ppm BTEX
S04-4
ND
ND
GRAVEL PAD
AIR TERMINAL BUILDING
HANGAR
2S08
109 ppm DRPH
0.8 ppm GRPH
2S09
8.5 ppm DRPH
3.2 ppm GRPH
SW07
178.4 ppb VOC
16 ppb B
SD07, SD08
4.45 ppm SVOC
9.7 ppm Arsenic
300 ppm DRPH
960 ppm GRPH
120 ppm RRPH
8.3 ppm BTEX
S03-2
ND
SD06
ND
SW06
ND
SD01
270 ppm DRPH
0.05 ppm BTEX
SW01
ND
GRAVEL PAD
S02-3
ND
ROAD
DIESEL TANK
S01-3.5
11 ppm GRPH
7.5 ppm BTEX
SD02
500 ppm DRPH
1200 ppm GRPH
4.0 ppm BTEX
SD04
ND
SW02
200 ppb GRPH
11 ppb BTEX
SW04, SW08
13.8 ppb VOC
ND
ROAD
SD05
11,000 ppm DRPH
114 ppm GRPH
3.8 ppm BTEX
SW05
1126 ppb GRPH
384 ppb BTEX
83 ppb B
2S10
7.2 ppm DRPH
ROAD
ROAD
ROAD
INACTIVE FUEL PIPELINE
TUNDRA
2S11, 2S12
55.7 ppm DRPH
3.3 ppm GRPH
0.4 ppm BTEX
North Salt Lagoon
SD03
450 ppm DRPH
SW03
136 ppb GRPH
26 ppb BTEX
2SD10
686 ppm DRPH
47.6 ppm GRPH
1.5 ppm BTEX
PLASTIC SHEETING BARRIER
GRAVEL PAD
2SD09
165 ppm DRPH
DEW LINE STATION APPROXIMATELY 2000 FEET
N
MAG. NORTH
50 0 50 100 150
SCALE IN FEET
LEGEND
BUILDINGS, STRUCTURES
ROADS
SOIL SAMPLE
SEDIMENT SAMPLE
SEDIMENT AND WATER SAMPLES
TUNDRA
SURFACE WATER
CULVERT
GRAVEL PAD BOUNDARY
SURFACE DRAINAGE
2.6 ppm CT&E DATA
0.9 ppm F&B DATA
0000 CONCENTRATIONS ARE ABOVE ACTION LEVELS
ND NO CONTAMINATION DETECTED
SVOC TOTAL SEMI-VOLATILE ORGANIC COMPOUNDS
VOC TOTAL VOLATILE ORGANIC COMPOUNDS
DRPH DIESEL RANGE PETROLEUM HYDROCARBONS
GRPH GASOLINE RANGE PETROLEUM HYDROCARBONS
RRPH RESIDUAL RANGE PETROLEUM HYDROCARBONS
BTEX TOTAL BTEX COMPOUNDS
B BENZENE
POINT BARROW RADAR INSTALLATION
USAF 611th CES
FIGURE NO. 5-1
AIR TERMINAL AREA (SS03) SAMPLE LOCATIONS AND ANALYTICAL RESULTS

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TABLE 5-1. AIR TERMINAL AREA ANALYTICAL DATA SUMMARY

Installation: Point Barrow
Site: Air Terminal Area (SS03)

Matrix: Soil
Units: mg/kg

Parameters	Detect. Limits	Quant. Limits	Action Levels	Bkgd. Levels	Environmental Samples							Field Blanks			Lab Blanks	
					S01-3.5	S02-3	S03-2	S04-4	S05-4	S06-4 & S07-4 (Replicates)		AB01	EB01	TB02		
Laboratory Sample ID Numbers					1122	1124	1126	1128 4424-1	1130	1132	1134	4395-2	1156/1158 4424-4	1154 4424-5	#5-9193 4395 4424	#5-83193 #1&2-9293 4424
ANALYSES	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/L	µg/L	µg/L	µg/L	mg/kg
DRPH	5-6	50-60	500[a]	<65J[b]-<180J[b]	<60[b]	<50[b]	<50[b]	<50[b]	<50[b]	<50[b]	<50[b]	NA	<1,000[b]	NA	<200	<50
GRPH	0.1	1	100	<3J[b]-<7J[b]	11J[b]	<1J[b]	<1J[b]	<1J[b]	<1J[b]	<1J[b]	<1J[b]	NA	<100J[b]	<100J[b]	NA	<1
RRPH (Approx.)	10-12	100-120	2,000[a]	<130-<360	<120	<110	<110	<100	<100	<100	<100	NA	<2,000	NA	<2,000	<100
BTEX (8020/8020 Mod.)			10 Total BTEX	<0.14-<0.31	7.51J	<0.10	<0.10	<0.10	0.28J	<0.10	<0.10					
Benzene	0.002	0.02	0.5	<0.03-<0.07	0.35	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<1[c]	<1	<1	<1	<0.02
Toluene	0.002	0.02		<0.03-<0.07	5.3	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<1[c]	<1	<1	<1	<0.02
Ethylbenzene	0.002	0.02		<0.03-<0.07	0.26	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<1[c]	<1	<1	<1	<0.02-<0.03
Xylenes (Total)	0.004	0.04		<0.05-<0.1	1.6J	<0.04	<0.04	<0.04	0.28J	<0.04	<0.04	<2[c]	<2	<2	<2	<0.04-<0.09
HVOC 8010	0.002	0.02		<0.03-<0.07	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NA	<1	<1	NA	<0.02
VOC 8260	0.020	0.020		<0.050J	NA	NA	NA	<0.020	NA	NA	NA	<1	<1	<1	<1	<0.020
SVOC 8270	0.200	<0.200	8,000	<3.80-<40.0	NA	NA	NA	<0.20-2.16U	NA	NA	NA	NA	NA	NA	NA	1.610
TOC				84,200-297,000	NA	NA	NA	1,380	NA	NA	NA	NA	NA	NA	NA	NA

- ☐ CT&E Data.
- ▩ F&B Data.
- NA Not analyzed.
- J Result is an estimate.
- U Compound is not present above the concentration listed.
- a The action levels for DRPH and RRPH are based on conversations with ADEC; final action levels have not yet been determined.
- b DRPH and GRPH concentrations reported for these samples are equivalent to diesel and gasoline range organics (DRO and GRO) as defined by ADEC.
- c BTEX determined by 8260 method analysis.

TABLE 5-1. AIR TERMINAL AREA ANALYTICAL DATA SUMMARY (CONTINUED)

Installation: Point Barrow
Site: Air Terminal Area (SS03)

Matrix: Sediment
Units: mg/kg

Parameters	Detect. Limits	Quant. Limits	Action Levels	Bkgd. Levels	Environmental Samples						Field Blanks			Lab Blanks	
					SD01	SD02	SD03	SD04	SD05	SD06	AB01	EB01	TB01		
Laboratory Sample ID Numbers					828	830	832	834	836	838	4395-2	1156/1158	776	#1&2-82593 #5-9193 #3&4-9293	#6-82893 4397
ANALYSES	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/L	µg/L	µg/L	µg/L	mg/kg
DRPH	6-7	60-70	500[a]	<65J[b]-<180J[b]	270J[b]	500J[b]	450J[b]	<70J[b]	11,000J[b]	<60J[b]	NA	<1,000[b]	NA	<200	<50
GRPH	0.2-0.3	2-3	100	<3J[b]-<7J[b]	<2J[b]	1,200J[b]	NA	<3J[b]	114J[b]	<2J[b]	NA	<400J[b]	<50J[b]	NA	NA
RRPH (Approx.)	10-22	100-220	2,000[a]	<130-<360	<100	<150	<220	<150	<140	<120	NA	<2,000	NA	<2,000	<100
BTEX (8020/8020 Mod.)			10 Total BTEX	<0.14-<0.31	0.046J	4.00J	NA	<0.15	3.8J	<0.10					
Benzene	0.002-0.020	0.02-0.03	0.5	<0.03-<0.07	<0.02	<0.03	NA	<0.03	<0.03	<0.02	<1[c]	<1	<1	<1	NA
Toluene	0.002-0.020	0.02-0.03		<0.03-<0.07	0.046J	<0.03	NA	<0.03	<0.03	<0.02	<1[c]	<1	<1	<1	NA
Ethylbenzene	0.002-0.020	0.02-0.03		<0.03-<0.07	<0.02	1.4J	NA	<0.03	0.5J	<0.02	<1[c]	<1	<1	<1	NA
Xylenes (Total)	0.004-0.040	0.04-0.06		<0.05-<0.1	<0.19	2.8J	NA	<0.06	3.3J	<0.04	<2[c]	<2	<2	<2	NA
HVOC 8010	0.002-0.003	0.02-0.03		<0.03-<0.07	<0.02	<0.03	NA	<0.03	<0.03	<0.02	NA	<1	<1	NA	NA
PCBs	0.01-0.02	0.1-0.2	10	<0.1-<0.4J	<0.1	<0.1	<0.2J	<0.1J	<0.1	<0.1J	NA	<2	NA	NA	<0.1

☐ CT&E Data.
▩ F&B Data.
NA Not analyzed.
J Result is an estimate.
a The action levels for DRPH and RRPH are based on conversations with ADEC; final action levels have not yet been determined.
b DRPH and GRPH concentrations reported for these samples are equivalent to diesel and gasoline range organics (DRO and GRO) as defined by ADEC.
c BTEX determined by 8260 method analysis.

TABLE 5-1. AIR TERMINAL AREA ANALYTICAL DATA SUMMARY (CONTINUED)

Installation: Point Barrow | Matrix: Sediment
Site: Air Terminal Area (SS03) | Units: mg/kg

Parameters	Detect. Limits	Quant. Limits	Action Levels	Bkgd. Levels	Environmental Samples SD07 & SD08 (Replicates)		Field Blanks AB01	Field Blanks EB01	Field Blanks TB01	Lab Blanks	
Laboratory Sample ID Numbers					840 4397-8	842 4397-9	4395-2	1156/1158 4424-4	776 4395-1	#5-9193 4424 4395	#6-82893 4397
ANALYSES	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/L	µg/L	µg/L	µg/L	mg/kg
DRPH	6-7	60-70	500^a	<65J^b-<180J^b	300J^b	110J^b	NA	<1,000^b	NA	<200	<50
GRPH	0.2-0.3	2-3	100	<3J^b-<7J^b	790J^b	960J^b	NA	<400J^b	<50J^b	NA	NA
RRPH (Approx.)	12	120	2,000^a	<130-<360	<120	120	NA	<2,000	NA	<2,000	<100
BTEX (8020/8020 Mod.)			10 Total BTEX	<0.14-<0.31	7.5J	8.3J					
Benzene	0.002-0.020	0.02-0.03	0.5	<0.03-<0.07	<0.02	<0.02	<1^c	<1	<1	<1	NA
Toluene	0.002-0.020	0.02-0.03		<0.03-<0.07	<0.02	<0.02	<1^c	<1	<1	<1	NA
Ethylbenzene	0.002-0.020	0.02-0.03		<0.03-<0.07	1J	1.2J	<1^c	<1	<1	<1	NA
Xylenes (Total)	0.004-0.040	0.04-0.06		<0.05-<0.1	6.5J	7.1J	<2^c	<2	<2	<2	NA
HVOC 8010	0.002-0.003	0.02-0.03		<0.03-<0.07	<0.02	<0.02	NA	<1	<1	NA	NA
SVOC 8270											
Naphthalene	0.200	2.3-2.5		<3.80-<40.0	1.87J	<2.30	NA	NA	NA	NA	<0.200
2-Methylnaphthalene	0.200	2.3-2.5		<3.80-<40.0	2.58	<2.30	NA	NA	NA	NA	<0.200
Pesticides	0.001-0.05	0.01-0.5		<0.01J-<1.8J	<0.01J-<0.5J	<0.01J-<0.5J	NA	<0.2J-<25R	NA	NA	<0.01

☐ CT&E Data.
▩ F&B Data.
NA Not analyzed.
J Result is an estimate.
R Result has been rejected.
a The action levels for DRPH and RRPH are based on conversations with ADEC; final action levels have not yet been determined.
b DRPH and GRPH concentrations reported for these samples are equivalent to diesel and gasoline range organics (DRO and GRO) as defined by ADEC.
c BTEX determined by 8260 method analysis.

TABLE 5-1. AIR TERMINAL AREA ANALYTICAL DATA SUMMARY (CONTINUED)

Installation: Point Barrow — Matrix: Sediment
Site: Air Terminal Area (SS03) — Units: mg/kg

Parameters	Detect. Limits	Quant. Limits	Action Levels	Bkgd. Levels	Environmental Samples: SD07 & SD08 (Replicates)		Field Blanks: AB01	Field Blanks: EB01	Field Blanks: TB01	Lab Blanks	
Laboratory Sample ID Numbers					840 4397-8	842 4397-9	4395-2	1156/1158 4424-4	776 4395-1	#5-9193 4424 4395	#6-82893 4397
ANALYSES	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/L	µg/L	µg/L	µg/L	mg/kg
PCBs	0.01	0.1	10	<0.1-<0.4J	<0.1	<0.1	NA	<2	NA	NA	<0.1
TOC				84,200-297,000	5,160	4,870	NA	NA	NA	NA	NA

☐ CT&E Data.
NA Not analyzed.
J Result is an estimate.

TABLE 5-1. AIR TERMINAL AREA ANALYTICAL DATA SUMMARY (CONTINUED)

Installation: Point Barrow
Site: Air Terminal Area (SS03)
Matrix: Soil/Sediment
Units: mg/kg

Parameters	Detect. Limits	Quant. Limits	Action Levels	Bkgd. Levels	Environmental Samples							Field Blanks			Lab Blanks	
					2S08	2S09	2S10	2S11 & 2S12 (Replicates)		2SD09	2SD10	AB01	2EB02	2TB03		
Laboratory Sample ID Numbers					4627-15	4627-16	4627-19	4627-20	4627-21	4627-11	4627-14	4395-3	4627-23	4627-22	4627 4395	4627
ANALYSES	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/L	µg/L	µg/L	µg/L	mg/kg
DRPH	4.00	4.00	500[a]	<65J[b]-<180J[b]	109[e]	8.49[d]	7.21[d]	55.7[d]	29.5[d]	195[f]	686[g]	NA	NA	NA	NA	<4.00
GRPH	0.400	0.400-0.600	100	<3J[b]-<7J[b]	0.799	3.19	<0.400	<0.600	3.30	<0.500	47.6	NA	<50	NA	<20	<0.400
BTEX (8020/8020 Mod.)			10 Total BTEX	<0.14-<0.31	NA	<0.125[c]	<0.125[c]	NA	0.413[c]	<0.125	1.526					
Benzene	0.020	0.025-0.120	0.5	<0.03-<0.07	NA	<0.025[c]	<0.025[c]	NA	<0.025[c]	<0.025	<0.120	<1[c]	<1	<1[c]	<1	<0.020
Toluene	0.020	0.025-0.120		<0.03-<0.07	NA	<0.025[c]	<0.025[c]	NA	<0.025[c]	<0.025	<0.120	<1[c]	<1	<1[c]	<1	<0.020
Ethylbenzene	0.020	0.025-0.120		<0.03-<0.07	NA	<0.025[c]	<0.025[c]	NA	0.038[c]	<0.025	0.330	<1[c]	<1	<1[c]	<1	<0.020
Xylenes (Total)	0.040	0.050-0.240		<0.05-<0.1	NA	<0.050[c]	<0.050[c]	NA	0.375[c]	<0.050	1.196	<2[c]	<2	<2[c]	<2	<0.040
VOC 8260	0.020	0.020-0.025		<0.050J	NA	<0.025	<0.020	NA	<0.025	NA	NA	NA	NA	NA	NA	<0.020

☐ CT&E Data.
▩ F&B Data.
NA Not analyzed.
J Result is an estimate.
a The action level for DRPH is based on conversations with ADEC; a final action level has not yet been determined.
b DRPH and GRPH concentrations reported for these samples are equivalent to diesel and gasoline range organics (DRO and GRO) as defined by ADEC.
c BTEX determined by 8260 method analysis.
d The laboratory reported that the EPH pattern in this sample was not consistent with a middle distillate fuel.
e The laboratory reported that 88.7 mg/kg of the EPH pattern in this sample was not consistent with a middle distillate fuel.
f The laboratory reported that 54.9 mg/kg of the EPH pattern in this sample was not consistent with a middle distillate fuel.
g The laboratory reported that 60.5 mg/kg of the EPH pattern in this sample was not consistent with a middle distillate fuel.

TABLE 5-1. AIR TERMINAL AREA ANALYTICAL DATA SUMMARY (CONTINUED)

Installation: Point Barrow
Site: Air Terminal Area (SS03)

Matrix: Soil/Sediment
Units: mg/kg

METALS ANALYSES

Parameters	Detect. Limits	Quant. Limits	Action Levels	Bkgd. Range from 7 DEW Line Installations	Environmental Samples						Field Blank			Lab Blanks
					S04-4	SD07 & SD08 (Replicates)						EB01		
Laboratory Sample ID Numbers					4424-1	4397-8	4397-9					4424-4		4397 4424
ANALYSES	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg					µg/L		µg/L
Aluminum	0.35	2-800		1,500-23,000	<800	1,900	800					<100		<100
Antimony	N/A	5.5-65		<7.8-<230	<5.5	<65	<58					<100		<100
Arsenic	0.11	55-65		<4.9-<7.0	<55	<65	9.7					<100		<100
Barium	0.024	1		27-390	70	67	44					<50		<50
Beryllium	N/A	2.7-3.2		<2.6-6.4	<2.7	<3.2	<2.9					<50		<50
Cadmium	0.33	2.7-3.2		<3.0-<27	<2.7	<3.2	<2.9					<50		<50
Calcium	0.69	4		360-59,000	680J	2,200	760					220		<200
Chromium	0.066	1-2.7		<4.3-47	<2.7	25	6.2					<50		<50
Cobalt	N/A	5.5-6.5		<5.1-12	<5.5	<6.5	<5.8					<50		<100
Copper	0.045	1-2.9		<2.7-45	2.8	4.3	<2.9					<50		<50
Iron	0.50	2		5,400-35,000	5,600	9,000	4,700					<100		<100
Lead	0.13	2-5.5		<5.1-22	<5.5	140	47					<100		<100
Magnesium	0.96	4		360-7,400	400J	1,500	370					<200		<200
Manganese	0.025	1		25-290	25	30	19					<50		<50
Molybdenum	N/A	2.7-3.2		<2.5-<11	<2.7	<3.2	<2.9					<50		<50
Nickel	0.11	1-2.9		4.2-46	3.0	5.4	<2.9					<50		<50
Potassium	23	100		<300-2,200	330	610	330					<5,000		<5,000

☐ CT&E Data.
N/A Not available
J Result is an estimate.

TABLE 5-1. AIR TERMINAL AREA ANALYTICAL DATA SUMMARY (CONTINUED)

Installation: Point Barrow
Site: Air Terminal Area (SS03)

Matrix: Soil/Sediment
Units: mg/kg

METALS ANALYSES

Parameters	Detect. Limits	Quant. Limits	Action Levels	Bkgd. Range from 7 DEW Line Installations	Environmental Samples						Field Blank			Lab Blanks
					S04-4	SD07 & SD08 (Replicates)						EB01		
Laboratory Sample ID Numbers					4424-1	4397-8	4397-9					4424-4		4397 4424
ANALYSES	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg					µg/L		µg/L
Selenium	1.2	5.5-65		<7.8-<170	<5.5	<65	<58					<100		<100
Silver	0.53	2.7-32		<3-<110	<2.7J	<32J	<29					<50		<50
Sodium	0.55	5		<160-680	86	200	120					<250		<250
Thallium	0.011	0.27-0.32		<0.2-<0.82	<0.27	<0.32	<0.29					<5		<5
Vanadium	0.036	1		6.3-59	8.5	13	6.7					<50		<50
Zinc	0.16	1		9.2-95	9.2	56	23					<50		<50

☐ CT&E Data.
J Result is an estimate.

TABLE 5-1. AIR TERMINAL AREA ANALYTICAL DATA SUMMARY (CONTINUED)

Installation: Point Barrow
Site: Air Terminal Area (SS03)

Matrix: Surface Water
Units: µg/L

Parameters	Detect. Limits	Quant. Limits	Action Levels	Bkgd. Levels	Environmental Samples								Field Blanks			Lab Blanks
					SW01	SW02	SW03	SW04 & SW08 (Duplicates)		SW05	SW06	SW07	AB01	EB01	TB01	
Laboratory Sample ID Numbers					794/843	798/844	800/845	800/846 4396-1	814/850 4396-3	806/847	810/848	812/846 4396-2	4395-2	1156/1158 4424-4	776 4395-1	#5-82893 4424/4395/4396
ANALYSES	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
DRPH	100	1,000		<1,000[b]	<1,000[b]	<1,000[b]	<1,000[b]	<1,000[b]	<1,000[b]	<1,000[b]	<1,000[b]	<1,000[b]	NA	<1,000[b]	NA	<200
GRPH	5	50		<50J[b]	<50J[b]	200J[ab]	136J[ab]	<50J[b]	<50J[b]	1,126J[ab]	<50J[b]	2,000R[ab]	NA	<100J[b]	<50J[b]	NA
RRPH (Approx.)	200	2,000		<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	NA	<2,000	NA	<2,000
BTEX (8020/8020 Mod.)																
Benzene	0.1	1	5	<1	<1	<1	<1	<1	<1	69	<1	22R	<1[c]	<1	<1	<1
Toluene	0.1	1	1,000	<1	<1	<1	10	<1	<1	<1	<1	110R	<1[c]	<1	<1	<1
Ethylbenzene	0.1	1	700	<1	<1	<1	5	<1	<1	21	<1	86R	<1[c]	<1	<1	<1
Xylenes (Total)	0.2	2	10,000	<2	<2	11	11	<2	<2	280	<2	120R	<2[c]	<2	<2	<2
HVOC 8010	0.1	1		<1	<1	<1	<1	<1	<1	<1	<1	<1R	NA	<1	<1	NA
VOC 8260																
Benzene	1	1	5	<1	NA	NA	NA	<1	<1	NA	NA	16	<1	<1	<1	<1
1,2-Dichloroethane	1	1	5	1.2	NA	NA	NA	<1	1.6J	NA	NA	<1	<1	<1	<1	<1
Ethylbenzene	1	1	700	<1	NA	NA	NA	<1	<1	NA	NA	4.8	<1	<1	<1	<1
Naphthalene	1	1		<1	NA	NA	NA	1.1J	<1	NA	NA	4.2	<1	<1	<1	<1
Toluene	1	1	1,000	<1	NA	NA	NA	<1	<1	NA	NA	74	<1	<1	<1	<1
1,2,4-Trimethylbenzene	1	1		<1	NA	NA	NA	2.7	2.4	NA	NA	8.9	<1	<1	<1	<1

□ CT&E Data.
▩ F&B Data.
NA Not analyzed.
J Result is an estimate.
R Result has been rejected.
a Total petroleum hydrocarbons in these water samples exceed the 15 µg/L stated for fresh water in ADEC's Water Quality Criteria 18AAC70 (ADEC 1989).
b DRPH and GRPH concentrations reported for these samples are equivalent to diesel and gasoline range organics (DRO and GRO) as defined by ADEC.
c BTEX determined by 8260 method analysis.

TABLE 5-1. AIR TERMINAL AREA ANALYTICAL DATA SUMMARY (CONTINUED)

Installation: Point Barrow
Site: Air Terminal Area (SS03)
Matrix: Surface Water
Units: µg/L

Parameters	Detect. Limits	Quant. Limits	Action Levels	Bkgd. Levels	Environmental Samples								Field Blanks			Lab Blanks
					SW01	SW02	SW03	SW04 & SW08 (Duplicates)		SW05	SW06	SW07	AB01	EB01	TB01	
Laboratory Sample ID Numbers					794/843	798/844	800/845	800/846 4396-1	814/850 4396-3	806/847	810/848	812/846 4396-2	4395-2	1156/1158 4424-4	776 4395-1	#5-82893 4424/4395/4396
ANALYSES	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
1,3,5-Trimethylbenzene	1	1		<1	NA	NA	NA	3.4	3.0	NA	NA	3.5	<1	<1	<1	<1
Xylenes (Total)	2	2	10,000	<1	NA	NA	NA	6.6	6.3	NA	NA	67	<2	<2	<2	<2
SVOC 8270	10	11		<10-<25	NA	NA	NA	<11	<11	NA	NA	<11	NA	NA	NA	<10
PCBs	0.2	2	0.5	<2	<2	<2	<2	<2	<2	<2	<2	<2	NA	<2	NA	NA
TOC	5,000	5,000		16,700-22,500	NA	NA	NA	16,000	17,200	NA	NA	33,500	NA	NA	NA	<5,000
TSS	100	200		5,000-6,000	NA	NA	NA	12,000	12,000	NA	NA	16,000	NA	NA	NA	<200
TDS	10,000	10,000		166,000J-213,000	NA	NA	NA	698,000	677,000	NA	NA	895,000	NA	NA	NA	<10,000

□ CT&E Data.
▓ F&B Data.
NA Not analyzed.
J Result is an estimate.

TABLE 5-1. AIR TERMINAL AREA ANALYTICAL DATA SUMMARY (CONTINUED)

Installation: Point Barrow
Site: Air Terminal Area (SS03)
Matrix: Surface Water
Units: µg/L
METALS ANALYSES: TOTAL
(DISSOLVED)

Parameters	Detect. Limits	Quant. Limits	Action Levels	Bkgd. Range from 7 DEW Line Installations	Environmental Samples						Field Blank			Lab Blanks
					SW04 & SW08 (Duplicates)		SW07					EB01		
Laboratory Sample ID Numbers					4396-1	4396-3	4396-2					4424-4		4424 4396
ANALYSES	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L					µg/L		µg/L
Aluminum	17.4	100		<100-350 (<100-340)	<100 (<100)	<100 (<100)	<100 (<100)					<100		<100
Antimony	N/A	100	6	<100 (<100)	<100 (<100)	<100 (<100)	<100 (<100)					<100		<100
Arsenic	5.3	100	50	<100 (<100)	<100 (<100)	<100 (<100)	<100 (<100)					<100		<100
Barium	1.2	50	2,000	<50-93 (<50-91)	<50 (<50)	<50 (<50)	120 (79)					<50		<50
Beryllium	N/A	50	4	<50 (<50)	<50 (<50)	<50 (<50)	<50 (<50)					<50		<50
Cadmium	1.7	50	5	<50 (<50)	<50 (<50)	<50 (<50)	<50 (<50)					<50		<50
Calcium	34.5	200		4,500-88,000 (4,100-86,000)	38,000 (38,000)	35,000 (36,000)	41,000 (38,000)					220		<200
Chromium	3.29	50	100	<50 (<50)	<50 (<50)	<50 (<50)	<50 (<50)					<50		<50
Cobalt	N/A	100		<100 (<100)	<100 (<100)	<100 (<100)	<100 (<100)					<50		<50
Copper	2.3	50	1,300	<50 (<50)	<50 (<50)	<50 (<50)	<50 (<50)					<50		<50
Iron	25	100		180-2,800 (<100-1,600)	3,100 (370)	2,800 (360)	6,000 (170)					<100		<100

☐ CT&E Data.
N/A Not available.

TABLE 5-1. AIR TERMINAL AREA ANALYTICAL DATA SUMMARY (CONTINUED)

Installation: Point Barrow Site: Air Terminal Area (SS03)		Matrix: Surface Water Units: µg/L			METALS ANALYSES: TOTAL (DISSOLVED)									
Parameters	Detect. Limits	Quant. Limits	Action Levels	Bkgd. Range from 7 DEW Line Installations	Environmental Samples						Field Blank			Lab Blanks
					SW04 & SW08 (Duplicates)		SW07					EB01		
Laboratory Sample ID Numbers					4396-1	4396-3	4396-2					4424-4		4424 4396
ANALYSES	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L					µg/L		µg/L
Lead	6.6	100	15	<100 (<100)	<100 (<100)	<100 (<100)	<100 (<100)					<100		<100
Magnesium	47.8	200		2,900-53,000 (2,600-54,000)	35,000 (34,000)	35,000 (34,000)	42,000 (40,000)					<200		<200
Manganese	1.24	50		<50-510 (<50-120)	160 (140)	140 (130)	160 (98)					<50		<50
Molybdenum	N/A	50		<50 (<50)	<50 (<50)	<50 (<50)	<50 (<50)					<50		<50
Nickel	5.5	50	100	<50 (<50)	<50 (<50)	<50 (<50)	<50 (<50)					<50		<50
Potassium	1,154	5,000		<5,000 (<5,000)	5,900 (5,500)	10,000 (11,000)	7,300 (6,700)					<5,000		<5,000
Selenium	62.4	100	50	<100 (<100)	<100 (<100)	<100 (<100)	<100 (<100)					<100		<100
Silver	2.6	50	50	<50 (<50)	<50 (<50)	<50 (<50)	<50 (<50)					<50		<50
Sodium	27.7	250		8,400-410,000 (8,200-450,000)	100,000 (97,000)	160,000 (160,000)	130,000 (120,000)					<250		<250
Thallium	0.57	5	2	<5 (<5)	<5 (<5)	<5 (<5)	<5 (<5)					<5		<5
Vanadium	1.8	50		<50 (<50)	<50 (<50)	<50 (<50)	<50 (<50)					<50		<50

☐ CT&E Data.
N/A Not available.

TABLE 5-1. AIR TERMINAL AREA ANALYTICAL DATA SUMMARY (CONTINUED)

Installation: Point Barrow
Site: Air Terminal Area (SS03)

Matrix: Surface Water
Units: µg/L

METALS ANALYSES: TOTAL
(DISSOLVED)

Parameters	Detect. Limits	Quant. Limits	Action Levels	Bkgd. Range from 7 DEW Line Installations	Environmental Samples						Field Blank			Lab Blanks
					SW04 & SW08 (Duplicates)		SW07					EB01		
Laboratory Sample ID Numbers					4396-1	4396-3	4396-2					4424-4		4424 4396
ANALYSES	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L					µg/L		µg/L
Zinc	8.2	50		<50-160 (<50)	<50 (<50)	<50 (<50)	<50 (<50)					<50		<50

☐ CT&E Data.
N/A Not available.

TABLE 5-2. IDENTIFICATION OF CHEMICALS OF CONCERN AT THE AIR TERMINAL AREA (SS03)

SITE	MATRIX	CHEMICAL DETECTED	MAXIMUM CONCENTRATION	UNITS	BACKGROUND RANGE	RBSL[a] CANCER	RBSL[a] NON-CANCER	ARAR[b]	CHEMICAL OF CONCERN
Air Terminal Area	Soil	DRPH	11,000J	mg/kg	<65J-<180J	--	--	500[c]	**Yes**
(SS03)		GRPH	1,200J	mg/kg	<3J-<7J	--	--	100[c]	**Yes**
		RRPH	120	mg/kg	<130-<360	--	--	2,000[c]	No
		Benzene	0.35	mg/kg	<0.03-<0.07	--	--	0.5[c]	No
		Toluene	5.3	mg/kg	<0.03-<0.07	--	5,400	--	No
		Ethylbenzene	1.4J	mg/kg	<0.03-<0.07	--	2,700	--	No
		Xylenes (Total)	7.1J	mg/kg	<0.05-<0.1	--	54,000	--	No
		Naphthalene	1.87J	mg/kg	<3.80-<40.0	--	100	--	No
		2-Methylnaphthalene	2.58	mg/kg	<3.80-<40.0	--	--	--	**Yes***
		Aluminum	1,900	mg/kg	1,500-25,000	--	--	--	No
		Arsenic	9.7	mg/kg	<4.9-<7.0	0.0366	8.1	--	**Yes**
		Barium	70	mg/kg	27-390	--	1,890	--	No
		Calcium	2,200	mg/kg	360-59,000	--	--	--	No
		Chromium	25	mg/kg	<4.3-47	--	135	--	No
		Copper	4.3	mg/kg	<2.7-45	--	999	--	No
		Iron	9,000	mg/kg	5,400-35,000	--	--	--	No
		Lead	140	mg/kg	<5.1-22	--	--	500[d]	No
		Magnesium	1,500	mg/kg	360-7,400	--	--	--	No
		Manganese	30	mg/kg	25-290	--	3,780	--	No
		Nickel	5.4	mg/kg	4.2-46	--	540	--	No
		Potassium	610	mg/kg	<300-2,200	--	--	--	No
		Sodium	200	mg/kg	<160-680	--	--	--	No
		Vanadium	13	mg/kg	6.3-59	--	189	--	No
		Zinc	56	mg/kg	9.2-95	--	8,100	--	No
	Surface Water[j]	GRPH	1,126J	µg/L	<50J	50	730	--	**Yes**

TABLE 5-2. IDENTIFICATION OF CHEMICALS OF CONCERN AT THE AIR TERMINAL AREA (SS03) (CONTINUED)

SITE	MATRIX	CHEMICAL DETECTED	MAXIMUM CONCENTRATION	UNITS	BACKGROUND RANGE	RBSL[a]		ARAR[b]	CHEMICAL OF CONCERN
						CANCER	NON-CANCER		
Air Terminal Area	Surface Water[i]	Benzene	83	µg/L	<1	0.617	--	5[e]	Yes
(SS03)	(Continued)	Toluene	74	µg/L	<1	--	96.5	1,000[f]	No
(Continued)		Ethylbenzene	21	µg/L	<1	--	158	700[f]	No
		Xylenes (Total)	280	µg/L	<2	--	7,300	10,000[f]	No
		Naphthalene	4.2	µg/L	<1	--	--	--	Yes*
		1,2-Dichloroethane	1.6J	µg/L	1.2	0.934	--	5[e]	No[h]
		1,2,4-Trimethylbenzene	8.9	µg/L	<1	--	--	--	Yes*
		1,3,5-Trimethylbenzene	3.5	µg/L	<1	--	--	--	Yes*
		Barium	120	µg/L	<50-93	--	256	2,000[g]	No
		Calcium	41,000	µg/L	4,500-88,000	--	--	--	No
		Iron	6,000	µg/L	180-2,800	--	--	--	No
		Magnesium	42,000	µg/L	2,900-53,000	--	--	--	No
		Manganese	160	µg/L	<50-510	--	18.3	--	No
		Potassium	10,000	µg/L	<5,000	--	--	--	No
		Sodium	160,000	µg/L	8,400-410,000	--	--	--	No

* Chemicals without an RBSL or ARAR are considered chemicals of potential concern and are discussed in the Final Point Barrow Risk Assessment, Section 2.1.5 (U. S. Air Force 1996).
a Risk-Based Screening Level.
b Applicable or Relevant and Appropriate Requirement.
c ADEC 1991.
d EPA 1991c.
e MCL, 52 FR 25690.
f MCL, 56 FR 3526 (30 January 1991).
g MCL, 56 FR 30266 (01 July 1991).
h Compound was not detected onsite at levels significantly (5x) above levels detected in background and blank samples.
i The concentrations for metals in surface water are total metals.
B The analyte was detected in the associated blank.
J Result is an estimate.

6.0 FEASIBILITY STUDY

The purpose of this section is to present the FS of remedial alternatives for the one site at the Point Barrow radar installation recommended for remedial action. This site was identified based on the findings of the RI, reported in Sections 1.0 through 3.0 of this document, and the Point Barrow Risk Assessment (U.S. Air Force 1996). The Point Barrow site recommended for remedial action and covered by this FS is the Air Terminal Area (SS03).

Complete RI results for this site are presented in Section 5.0. This FS describes the evaluation of remedial alternatives used as the basis for the selection of the proposed remedial action for the site.

The one site requiring no further action and the one site requiring further characterization based on the RI and Risk Assessment are not included in this section. The proposed no further action site is the Diesel Fuel Spill (SS01). RI results for this site are presented in Section 3.0. The Garage (SS02) site requires further characterization and is discussed in Section 4.0.

This FS complies with the NCP. It has been streamlined as described in the following section. The remainder of the introduction consists of a discussion of the streamlining approach, including risk management decisions and an outline of the organization of the FS.

6.0.1 Approach To Feasibility Study

This FS is streamlined as follows to minimize unnecessary evaluation of remedial alternatives for the Air Terminal Area (SS03) site at Point Barrow.

- Remedial action characterization tables recommended in the AFCEE Handbook (U.S. Air Force 1991) have been adapted to focus on the data essential to the evaluation of remedial alternatives. Wherever possible, reference will be made to the RI and Risk Assessment for detailed site information, and assumptions used in calculating risk and identifying COCs.

- General response actions (GRAs) and applicable technologies are screened together, and the alternatives are limited to no more than five proven conventional and innovative methods including the required no action alternative.

- Repetition of information presented in the RI (Section 1.0 through 5.0 of this report) and the Point Barrow Risk Assessment is minimized. Data essential to evaluating remedial alternatives are presented in summary tables.

6.0.2 Risk Management Decisions

Two risk management decisions were made in writing the FS, based on a thorough review of the data. The first relates to the list of COCs, and the second to contamination in surface water.

- The remedial alternatives of the Air Terminal Area (SS03) do not address arsenic, although arsenic is identified in the risk assessment as a COC. Only one sediment sample exceeds the noncancer RBSL, cancer RBSL, and background concentration. Arsenic is not addressed because (1) it is unrelated to any known activity at the installation and is therefore probably natural; (2) the concentration in the one sediment sample (9.7 mg/kg) is close to the high end of the background range (7 mg/kg), and well within a normal background range throughout North America (1-50 ppm) (Lindsay 1979); and (3) it was detected in only one sample.

- Surface water in tundra areas has been affected by contamination at the installation. Methods for remediating water directly are not promising because the surface water is extremely shallow, covers a wide area, remains frozen for over half the year, and is intimately associated with tundra. ADEC recognizes that physical remedial actions in tundra are often more ecologically damaging than the petroleum hydrocarbons (Interim Guidance for Non-UST Contaminated Soil Cleanup Levels, Guidance No. 001 - Revision Number 1, July 17, 1991, Page 10). Instead of evaluating direct remedial alternatives for water in otherwise natural tundra areas, the approach has been taken that remediation of the source will improve the quality of surface water over time; therefore, COCs identified in surface water (e.g., benzene) are not considered in the preparation of this FS. The preferred remedial alternative includes a provision for sampling surface water to confirm the effectiveness of remedial actions.

These risk management decisions permit the focus of the FS to be on cleaning up the source of contamination at the Air Terminal Area (SS03). The primary COCs in site soils/sediments are DRPH and GRPH.

6.0.3 Organization

The FS is organized as follows:

- Introduction;

- Site characterization for remediation (considers COCs, ranges of chemicals detected, estimated areas and volumes of affected media, ARARs, and target cleanup levels or proposed remediation goals for each site);

- Screening of GRAs and presentation of representative remedial technologies;

- Development of remedial alternatives;

- Detailed evaluation of remedial alternatives (the detailed analysis is based on the AFCEE guidance and includes analyses of the nine NCP criteria). The detailed evaluation also includes a comparative analysis of alternatives, and identification of preferred alternatives;

- Siting study; and
- Detailed cost estimates and estimates of project duration in attachments A and B, respectively.

6.1 SITE CHARACTERIZATION FOR REMEDIATION

Information relevant to the screening and evaluation of remedial alternatives for the Air Terminal Area (SS03) at Point Barrow is summarized in Table 6-1. The table includes COCs in site soils/sediments, ranges of COCs detected, estimates of volumes of affected media, and the basis for listing each as a COC.

6.1.1 Summary of Site Information

The information considered for the Air Terminal Area (SS03) includes:

- medium;
- COCs;
- range of COCs detected;
- target cleanup level (or proposed remediation goal - the lowest applicable action level, based on the risk assessment including cancer risk, noncancer HQ, and chemical-specific ARARs);
- basis for the target cleanup level (specific ARAR, cancer risk or noncancer HQ); and
- design parameters for remedial action.

6.1.2 Estimated Area, Volume, and Mass of Contaminated Media

The approximate area, volume, and mass of contaminated media at the Air Terminal Area (SS03) is presented in Table 6-2. Areas and depths are estimated based on the RI, and the density is estimated to be 1.8 tons/cubic yard. Actual areas and depths of contamination may differ from the estimates which will affect the cost of remediation. The location and estimated volume of contaminated media are illustrated in Figure 6-1. The estimated total volume of contamination at the Air Terminal Area (SS03) site is 30,000 cubic yards of tundra.

General response actions and remedial alternatives are screened and evaluated for the site in Sections 6.2 through 6.4.

Estimates of cost and project duration are provided in Attachments A and B, respectively. These attachments are located at the end of Section 6.0.

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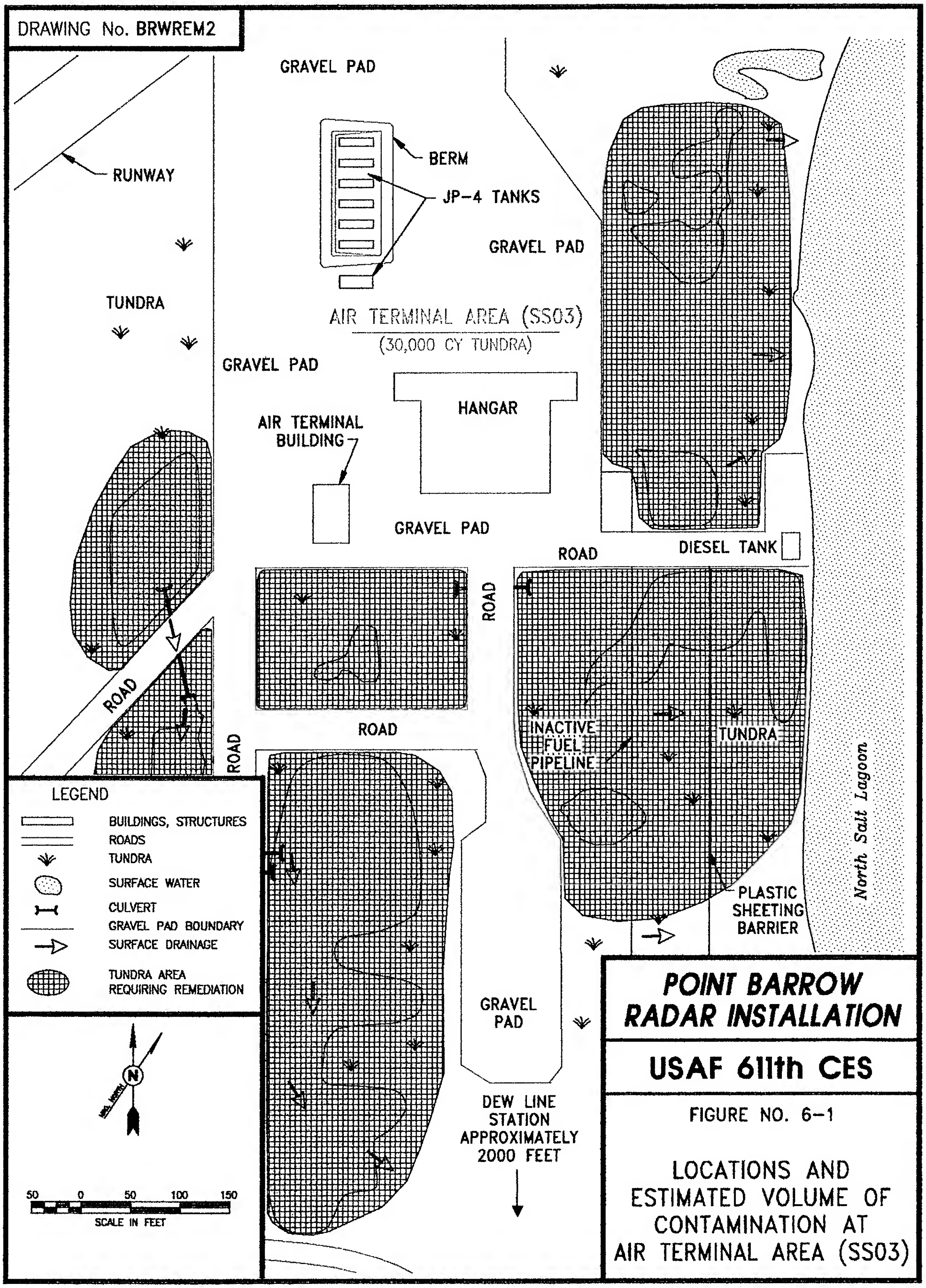
DRAWING No. BRWREM2
GRAVEL PAD
RUNWAY
BERM
JP-4 TANKS
GRAVEL PAD
TUNDRA
AIR TERMINAL AREA (SS03)
(30,000 CY TUNDRA)
GRAVEL PAD
HANGAR
AIR TERMINAL BUILDING
GRAVEL PAD
ROAD
DIESEL TANK
ROAD
ROAD
ROAD
ROAD
INACTIVE FUEL PIPELINE
TUNDRA
PLASTIC SHEETING BARRIER
North Salt Lagoon
GRAVEL PAD
DEW LINE STATION APPROXIMATELY 2000 FEET
LEGEND
BUILDINGS, STRUCTURES
ROADS
TUNDRA
SURFACE WATER
CULVERT
GRAVEL PAD BOUNDARY
SURFACE DRAINAGE
TUNDRA AREA REQUIRING REMEDIATION
N
50 0 50 100 150
SCALE IN FEET
POINT BARROW RADAR INSTALLATION
USAF 611th CES
FIGURE NO. 6-1
LOCATIONS AND ESTIMATED VOLUME OF CONTAMINATION AT AIR TERMINAL AREA (SS03)

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TABLE 6-1. REMEDIAL ACTION CHARACTERIZATION FOR THE AIR TERMINAL AREA (SS03)

MEDIA	COCs	RANGE OF ENVIRONMENTAL CONTAMINATION	TARGET CLEANUP LEVEL[a]	BASIS FOR LISTING AS COC	VOLUME OF CONTAMINATED MEDIA	DESIGN PARAMETERS
Tundra (Soil/Sediment)	DRPH	ND - 11,000 mg/kg	500 mg/kg	ADEC Non-UST Action Level	30,000 cy	• microbial activity • soil moisture • nutrient levels • soil pH
	GRPH	ND - 1,200 mg/kg	100 mg/kg	ADEC Non-UST Action Level		

[a] Target cleanup levels based on ADEC Non-UST guidance do not necessarily correspond to final site-specific cleanup goals.

TABLE 6-2. APPROXIMATE AREA, VOLUME, AND MASS OF CONTAMINATED MEDIA AT THE AIR TERMINAL AREA (SS03)

SITE	MEDIUM	AREA (sq ft)	DEPTH (ft)	VOLUME (cy)	MASS (tons)
Air Terminal Area (SS03)	tundra	326,500	2.5	30,000	54,000

6.1.3 ARARs

According to the NCP, ARARs must be identified and evaluated to determine all of the requirements for remedial actions. There are three categories of ARARs:

- Chemical-specific;
- Action-specific; and
- Location-specific.

Chemical-specific ARARs are action levels that may apply in addition to risk or hazard-based remediation goals. Chemical-specific ARARs were identified during the RI and included in the Risk Assessment. The target cleanup levels or proposed remediation goals represent the lowest applicable action level.

Action-specific ARARs are requirements that relate to how remedial actions must be conducted. For example, offsite transportation of hazardous waste must be manifested in compliance with RCRA requirements.

Location-specific ARARs impose requirements on a remedial action based on the location of the site. For example, there are specific requirements that pertain to wetlands.

It should be noted that ADEC's Interim Guidance for Non-UST contaminated soil target cleanup levels are intended as guidance and do not necessarily correspond to final site-specific cleanup levels. The ARARs for the Air Terminal Area (SS03) site at the Point Barrow installation are presented in Table 6-3.

6.2 SCREENING OF GENERAL RESPONSE ACTIONS

6.2.1 Presentation and Screening of GRAs for the Air Terminal Area (SS03)

GRAs are general approaches for remedial actions and can be active or passive measures. Active measures involve removal, active treatment, or isolation of the contaminated media. Passive measures rely on natural processes to reduce the toxicity, mobility, or volume of contamination, or on controls put in place to limit exposure. GRAs apply to contaminants in all of the environmental media separately, or in any combination. Screening GRAs streamlines the

TABLE 6-3. ARARs FOR THE AIR TERMINAL AREA (SS03)

AUTHORITY	CITATION	TYPE OF ARAR	BASIS	CATEGORY OF ARAR
RCRA	40 CFR Part 263	Action-specific	Standards Applicable to Generators of Hazardous Waste	Relevant and Appropriate
RCRA	40 CFR 268.35	Action-specific	Land Disposal Restrictions	Relevant and Appropriate
Clean Air Act	42 U.S.C. 7401-7642, 40 CFR 60, 61, and 63	Action-specific	National Ambient Air Quality Standards (Treatment technology standards for fugitive emissions and landfills)	Applicable
RCRA	55 FR 30798	Chemical-specific	Standard for Solid Waste Management Units, SWMUs, in the RCRA Corrective Action Program	Relevant and Appropriate
SDWA	52 FR 25690 56 FR 3526	Chemical-specific	Maximum Contaminant Level for drinking water	Relevant and Appropriate
ADEC, Interim Guidance for Non-UST Action Levels	18 AAC 75.140	Chemical-specific	Standards for general guidance	Relevant and Appropriate
ADEC, Interim Guidance for Surface and Groundwater Cleanup Levels	AS 46.03.070, AS 46.09.020, 18 AAC 70.020 (b), AS 46.04.020, 18 AAC 75.140, 18 AAC 70.025, 18 AAC 70.030 18 AAC 70.010, and 18 AAC 70.040	Location-specific	Standards applicable for water used for drinking and surface water important to the growth and propagation of aquatic life	Relevant and Appropriate

FS process by establishing the feasibility of entire classes of remedial responses, thereby enabling the selection of a focused set of viable alternatives for detailed evaluation. GRAs have been evaluated for contaminated tundra at the Air Terminal Area (SS03).

The criteria for screening GRAs are implementability, duration, effectiveness, and cost. Implementability is estimated in terms of technical and administrative barriers. For example, containment is generally less acceptable to regulatory agencies than removal or treatment. Additionally, an innovative technology that has proven to be effective in the continental U.S. may not be implementable on the North Slope because it cannot be transported there.

Duration is the estimate of the time necessary to attain the treatment efficiency estimated from applicable case studies and the literature. The estimated duration of no action that includes passive biodegradation is long even though the time necessary to implement no action is short.

Effectiveness is the relative success of the response action in reducing contamination and risk to acceptable levels.

Cost is the estimated capital, operating, and administrative costs necessary to attain the projected treatment efficiency. This estimate is presented in relative terms (low, medium, and high).

The GRAs considered for the Air Terminal Area (SS03) at Point Barrow are:

- No action;
- Institutional controls and monitoring;
- Containment;
- Onsite Treatment; and
- Removal.

These GRAs are defined as follows:

No Action. Under no action, contaminants are left in place and only natural processes, such as biodegradation, would lower the concentrations of COCs.

Institutional Controls and Monitoring. Institutional controls and monitoring represent a passive response in which steps are taken to minimize the possibility of accidental exposure of humans and the environment to COCs. Institutional controls may include fencing off an area to minimize exposure and public education to show people how to avoid exposure. Institutional control of sites contaminated by petroleum hydrocarbons minimizes the chance of accidental exposure while passive biodegradation occurs. Monitoring is included to determine if migration of contaminants is occurring and if natural processes are lowering the concentrations of the COCs.

Containment. Containment limits the potential for accidental exposure to contaminants by physical means. Examples include capping soils and using solidification techniques. Objectives can include one or more of the following: 1) minimize the risk of direct exposure to contaminated soils; 2) eliminate the possibility of contaminants or contaminated soils becoming airborne and

migrating; and 3) prevent water from entering the contaminated area and transporting contaminants to other areas.

Onsite Treatment. Treatment may be used to reduce the toxicity, mobility, or volume of a contaminant and may be accomplished in situ or ex situ. In situ treatment involves active treatment with the medium in place. Ex situ treatment involves the removal of the contaminated medium, with subsequent treatment at the installation. The medium may be replaced in the original excavation after treatment. Treatment efficiencies vary depending on the technique used and the type of contaminant present.

Removal. Removal involves excavating the contaminated medium and shipping it offsite for treatment or disposal. Removal reduces the risk of exposure to the contaminant, because it no longer remains at the installation. There is some risk to remedial workers during the excavation and shipping process.

The applicability of these GRAs at Point Barrow was determined using AFCEE screening criteria: implementability, project duration, effectiveness, and cost benefit. Representative technologies for the GRAs retained are presented and screened in Section 6.2.2. GRAs considered for remediation of the tundra at the Air Terminal Area (SS03) are presented in Table 6-4. No action, institutional controls and monitoring, and onsite treatment were retained for evaluation.

6.2.2 Presentation of Technologies

This section describes remedial technologies considered for use at the Point Barrow Radar Installation based on the retained GRAs. The selected technologies have all been effective in the Alaskan environment. The conditions present at Point Barrow, principally the arctic climate and remote location, exclude many technologies that could be considered for sites in a more temperate and accessible location.

The remedial technologies under consideration for the contaminated tundra at the Air Terminal Area (SS03) are presented in this section by GRA as follows:

<u>No Action</u>

- No action

<u>Institutional Controls and Monitoring</u>

- Monitoring
- Public education
- Fencing

<u>Onsite Treatment</u>

- Enhanced bioremediation

TABLE 6-4. SCREENING OF GENERAL RESPONSE ACTIONS FOR REMEDIATION OF THE AIR TERMINAL AREA (SS03)

GENERAL RESPONSE ACTION	REPRESENTATIVE TECHNOLOGIES	PROJECTED TREATMENT EFFICIENCY	RETAINED OR REJECTED	RATIONALE
No Action	• No Action	50 percent	Retained	Implementability: Moderate Duration: Short in the field, long to achieve passive bioremediation. Effectiveness: Low Cost: Low Retained/Rejected: Retained (requirement of NCP).
Institutional Controls and Monitoring	• Monitoring • Public Education • Fencing	50 percent	Retained	Implementability: High Duration: Moderate in the field, long to achieve passive bioremediation. Effectiveness: Moderate Cost: Low Retained/Rejected: Retained due to high implementability, moderate effectiveness and low cost.
Containment	• Solidification • Capping	80 percent reduction in mobility	Rejected	Implementability: Low Duration: Long Effectiveness: Low Cost: Moderate Retained/Rejected: Rejected due to low implementability, low effectiveness, and long duration.
Onsite Treatment	• Enhanced Bioremediation	94 percent	Retained	Implementability: High Duration: Short to Moderate Effectiveness: Moderate to High Cost: Moderate Retained/Rejected: Retained due to high implementability and moderate to high effectiveness.
Removal	• Offsite treatment/disposal	100 percent	Rejected	Implementability: Low Duration: Short Effectiveness: High Cost: High Retained/Rejected: Rejected due to low implementability and high cost.

All of the technologies presented above have been applied effectively at sites on the North Slope or elsewhere in Alaska. In addition to being effective in cold climates, they are well-suited to the short summer season (the only favorable time for outdoor remedial activities) and the remote location where there is little or no staffing for year-round operation and maintenance of remedial systems. Specifically, these remedial technologies are either short-term actions that can be completed in one season (approximately 100 days) with imported labor, or longer term actions that are self-sustaining and require minimal labor.

All three of the retained remedial technologies involve bioremediation, which can be accomplished on the North Slope with psychrophilic (i.e., cold weather) microorganisms both indigenous and imported. Bioremediation has been documented on the North Slope and elsewhere in Alaska, but is subject to several limiting factors including:

- availability of nutrients and oxygen;
- short periods of thaw; and
- percentage of fine-grained materials.

Biodegradation can generally be estimated in terms of first order kinetics, where the only rate limiting factor is the biodegradation potential, which is a function of the factors listed above. With first order kinetics, a given target cleanup level will eventually be reached regardless of the initial concentration; however, as the gap between initial and target concentrations widens or rate limiting factors become more significant, the time necessary to reach the target increases exponentially because the function plots asymptotically with concentration. A more detailed discussion of the estimates of biodegradation is presented in Section 6.4.

Descriptions of the technologies that have been retained are presented in the following subsections.

6.2.2.1 No Action. No action is a required alternative of the NCP, the purpose of which is to provide a baseline for assessment of other alternatives.

6.2.2.2 Institutional Controls and Monitoring. This technology involves no active treatment, but takes advantage of natural biodegradation that occurs in the arctic soil (Atlas 1985). Natural bioremediation typically takes longer than enhanced bioremediation. The rate of biodegradation, especially in the North Slope region, is reduced because of short warm seasons and prolonged harsh winters. Public education and fencing off the affected area would constitute institutional controls and monitoring would include sampling and analysis of any associated surface water and soil/sediment.

Institutional controls and monitoring are being evaluated for the petroleum-related contaminants in tundra. The case studies used to support biodegradation-based alternatives were used to estimate potential rates of passive bioremediation.

6.2.2.3 Enhanced Bioremediation. The onsite treatment ERA retained is enhanced bioremediation. Enhanced bioremediation in this FS involves delivering water and nutrients to the contaminated soils in place to assist natural bioremediation. Several organisms that can

utilize the carbon in petroleum are indigenous to the North Slope, including *Bacillus cereus, Bacillus polymixa, Arthrobacter globiformis*, and *Alcaligenes poradoxus* (Ratliff 1993). In addition, several strains of *Pseudomonas* bacteria (psychrophilic genera) decreased TPH concentration in tundra during the summer season in the Prudhoe Bay area (Jorgenson et al. 1992). A case study conducted at Point Thompson, Alaska, suggests that this approach is feasible for remediation of gravel pads if a cultured population of microbes is used (Liddell et al. 1991). The cultured population could be either indegenous or exotic. A treatability study will be necessary to determine how best to bioremediate the tundra at the Air Terminal Area (SS03).

Variations in temperature affect the rate of biodegradation by bacteria. In the arctic environment, bacteria remain active enough to consume petroleum hydrocarbon molecules from June through August when temperatures are warmest. Successful biodegradation of petroleum hydrocarbon contaminants in soil by indigenous bacteria is possible at the ambient arctic summer temperatures (Evans, Elder, and Hoffman 1992). A study at Surfcote Pad in the Prudhoe Bay area (Evans, Elder, and Hoffman 1992) indicates that native microbial populations are capable of bioremediating diesel contaminated gravel at an appreciable rate during the short summer season. In the arctic environment at the depth of three feet microbial populations can effectively consume hydrocarbon products (Atlas 1985); however, the number and activity of bacteria decrease with depth because of lower temperatures and reduced levels of oxygen and nutrients.

Enhanced bioremediation is being evaluated for tundra at the Air Terminal Area (SS03). Water and nutrients may be added intermittently based on the results of a treatability study. It is anticipated that this process will not generate runoff. Nonetheless, a wastewater discharge permit may be required for this process and precautions will be taken to contain any runoff that occurs. It is not expected that contaminants would be mobilized by this process, but any collected runoff would be analyzed to confirm this. Figure 6-2 is a process flow diagram of enhanced bioremediation.

6.3 DEVELOPMENT OF REMEDIAL ALTERNATIVES

6.3.1 Approach to Developing Remedial Alternatives

The remedial technologies selected in Section 6.2.2 represent the GRAs retained in Section 6.2.1. In this section, the remedial technologies are developed into alternatives designed to address site-specific COCs. Alternatives developed in this section are evaluated in the detailed evaluation of remedial alternatives in Section 6.4.

This section is organized by remedial alternative. The rationale for development is also included in this section. Remedial alternatives are summarized in Table 6-5 at the end of this section. The remedial alternatives for contaminated tundra at the Air Terminal Area (SS03) site are:

- No Action
- Institutional Controls and Monitoring
- Enhanced Bioremediation

Figure 6-2: Enhanced Bioremediation Process Flow Diagram

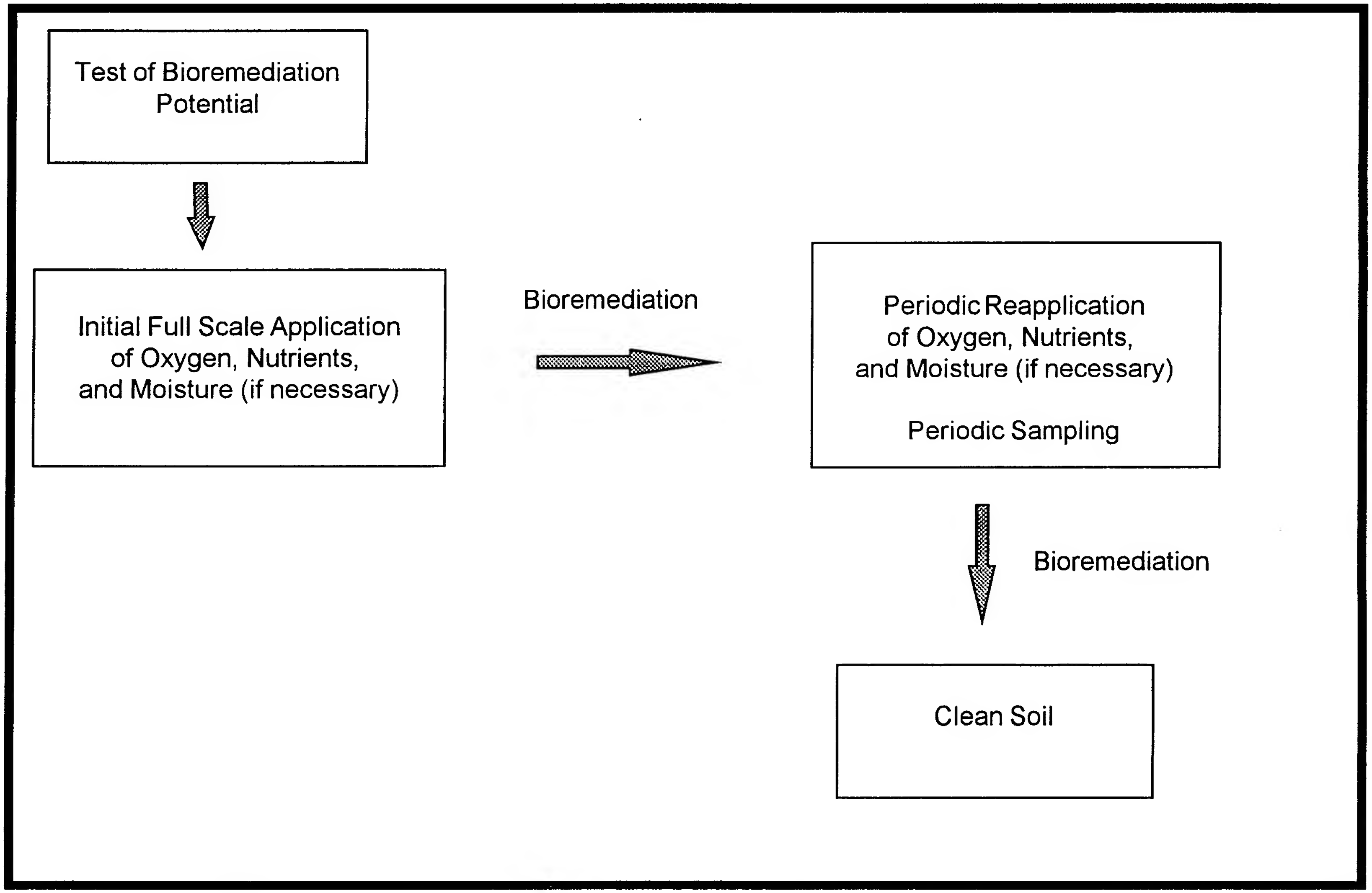

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TABLE 6-5. SUMMARY OF REMEDIAL ALTERNATIVES EVALUATED

SITE	MEDIA	REMEDIAL ALTERNATIVES
Air Terminal Area (SS03)	Tundra	No action Institutional controls and monitoring Enhanced bioremediation

6.3.1.1 No Action.

Rationale for Development. No action provides a baseline against which other alternatives are compared, and it is a required alternative according to the NCP. Natural attenuation of petroleum hydrocarbons may occur over a long period of time through biodegradation if microbial populations and conditions (e.g., water, oxygen, temperature, and nutrients) are present that facilitate aerobic biodegration.

6.3.1.2 Institutional Controls and Monitoring.

Rationale for Development. This limited action alternative is applicable to the site because the COCs do not pose a significant cancer risk or noncancer hazard. Natural attenuation of petroleum hydrocarbons may occur over a long period of time through passive biodegradation if microbial populations and conditions (e.g., water, oxygen, temperature, and nutrients) are present that facilitate aerobic biodegration.

Institutional controls considered include public education and fencing off the affected area. Monitoring would be carried out every two years to ensure that contaminants are biodegrading and are not migrating offsite.

6.3.1.3 Enhanced Bioremediation.

Rationale for Development. This is an effective low maintenance method of reducing petroleum concentrations in tundra. Enhanced bioremediation is more aggressive than natural attenuation, yet can be designed to limit disturbance of the tundra and permafrost.

Monitoring of the tundra will verify the progress of the bioremediation.

6.4 DETAILED EVALUATION OF REMEDIAL ALTERNATIVES

6.4.1 Approach

The alternatives developed in Section 6.3 are evaluated in this section using the suggested criteria in the AFCEE guidance for remedial alternative evaluation. These five criteria are defined in Sections 6.4.1.1 through 6.4.1.5. The detailed evaluation of alternatives is conducted in

Section 6.4.2 and summarized in Section 6.4.3. The alternatives are evaluated with respect to the NCP's nine criteria in Section 6.4.4. The preferred alternative is presented in Section 6.4.5.

6.4.1.1 Successful Application Of The Technology Under Site Conditions. This criterion requires the location and approximate date of the applications, the managing entity, and a presentation of successful applications of the given alternative under conditions similar to those found at the Point Barrow installation. Case studies conducted on the Alaskan North Slope are used to the extent possible.

6.4.1.2 Total Project Cost. The total cost of performing the remedial alternative is estimated and divided into technology testing, capital, total labor, operating, environmental testing, closure, and indirect costs.

For the purpose of this evaluation, the itemized cost elements are defined as follows:

- Technology testing costs consist of pilot tests or treatability studies;
- Capital costs include equipment or materials purchased;
- Total labor costs include the labor required for operating and maintaining the remedial action system, oversight, project management, design and development of planning documents;
- Operating costs include costs other than labor associated with operating remedial systems (e.g., nutrients);
- Environmental testing costs are for sampling and analysis, including periodic monitoring, and monitoring associated with site closure; and
- Closure costs related to reporting associated with site closure.

6.4.1.3 Contaminant Reduction. The reduction in concentration of each COC may be projected for the medium and the site based on case-study derived efficiencies. This reduction, referred to as post-remedial concentration, is listed with the initial concentration and target cleanup level. Post-remedial concentration is a more useful measure of effectiveness than risk reduction for the remedial alternatives at the Air Terminal Area (SS03).

None of the COCs present significant cancer risk or noncancer HQ. Risks or HQs, therefore, are not the indicators of successful remediation. Post-remedial concentration is applicable to target cleanup concentrations set by regulations and/or cleanup guidance.

The concentrations presented in Section 6.4.3 are defined as follows:

Initial Concentration. This is the maximum initial concentration of the COC detected. The average concentrations of sample results that exceed target cleanup levels are included in parenthesis.

Target Cleanup Level. This is the cleanup level specified for the given COC (the basis for which is presented in Table 6-1).

Post Remedial Concentration. This is the estimated final concentration of the COC based on remedial efficiencies from case studies. References to these case studies can be found in Section 6.4.2.1, successful applications of alternatives. Specific estimated efficiencies used are presented below. The estimates are independent of time (over the short term, e.g., one year, biodegradation would be significantly less efficient than active remedial alternatives like excavation and offsite treatment).

The following efficiencies are used for DRPH and GRPH:

- Enhanced bioremediation - 94 percent
- Institutional controls and monitoring and no action - 50 percent (Natural, unassisted bioremediation)

The post-remedial concentration is estimated using the following formula (assuming no time constraints):

Post-remedial Concentration = Initial Concentration x (1 - Remedial Efficiency)

6.4.1.4 Project Duration. The estimated duration of each remedial alternative and associated project schedule is an important consideration because of the seasonal limitations on outdoor work and the lack of personnel to perform operation and maintenance activities in this remote location. The North Slope of Alaska is frozen and covered with snow and ice for the majority of the year, leaving a period of only approximately 100 days in the summer when the weather is favorable for outdoor work. Outdoor phases of remedial actions significantly longer than 100 days must be suspended until the following summer, causing a marked increase in duration because of the extended winter down time. In order to maximize efficiency, remedial alternatives were designed either to complete outdoor phases of remediation within this narrow time frame or extend over a longer term and require only minimal labor.

Project durations are based on case studies from Alaska. The rates of biological degradation for enhanced bioremediation and naturally occurring bioremediation associated with institutional controls and monitoring are expressed as a first order decay function. The first-order decay function used to model this biological degradation is $C = C_o e^{-kt}$ (C is final concentration, C_o is the initial concentration, e is the natural logarithm, k is a constant based on case studies, and t is time).

The rate constant, k, is estimated based on related case studies. In general, the k-values presented reflect the lower end of the expected range of values. These values are then downwardly adjusted because of the arctic environment conditions. DRPH is used to estimate the constants for all of the petroleum hydrocarbons because it represents the higher concentration of COC at the Air Terminal Area (SS03) site. The concentration of DRPH, in other words, is assumed to be the controlling factor in determining the effectiveness of the remedial alternatives. The following constants and criteria were used for estimation of remedial rates:

DRPH Reduction

No action and institutional controls and monitoring (Natural, unassisted bioremediation) $k = 0.0025$/day

The k-value for no action and institutional controls and monitoring is based on rate data from a control cell in an experiment to measure the effectiveness of enhanced bioremediation (Liddell et al. 1991). The case study k-value was decreased in an attempt to offset the bias that aeration of the control cell introduces.

Enhanced bioremediation $k = 0.008$/day

This rate is based on the rates found from observing a number of case studies. It represents the low end of the range of decay constants observed because many of the case studies took place under climatic conditions more favorable than those which exist at the Point Barrow radar installation.

A comparison of the predicted degradation of DRPH using the three bioremedial alternatives being evaluated is illustrated in Figure 6-3 (no action and institutional controls and monitoring are both represented by natural unassisted bioremediation).

The duration of onsite remedial activity and the total project duration are presented in Attachment B. These durations are defined as follows:

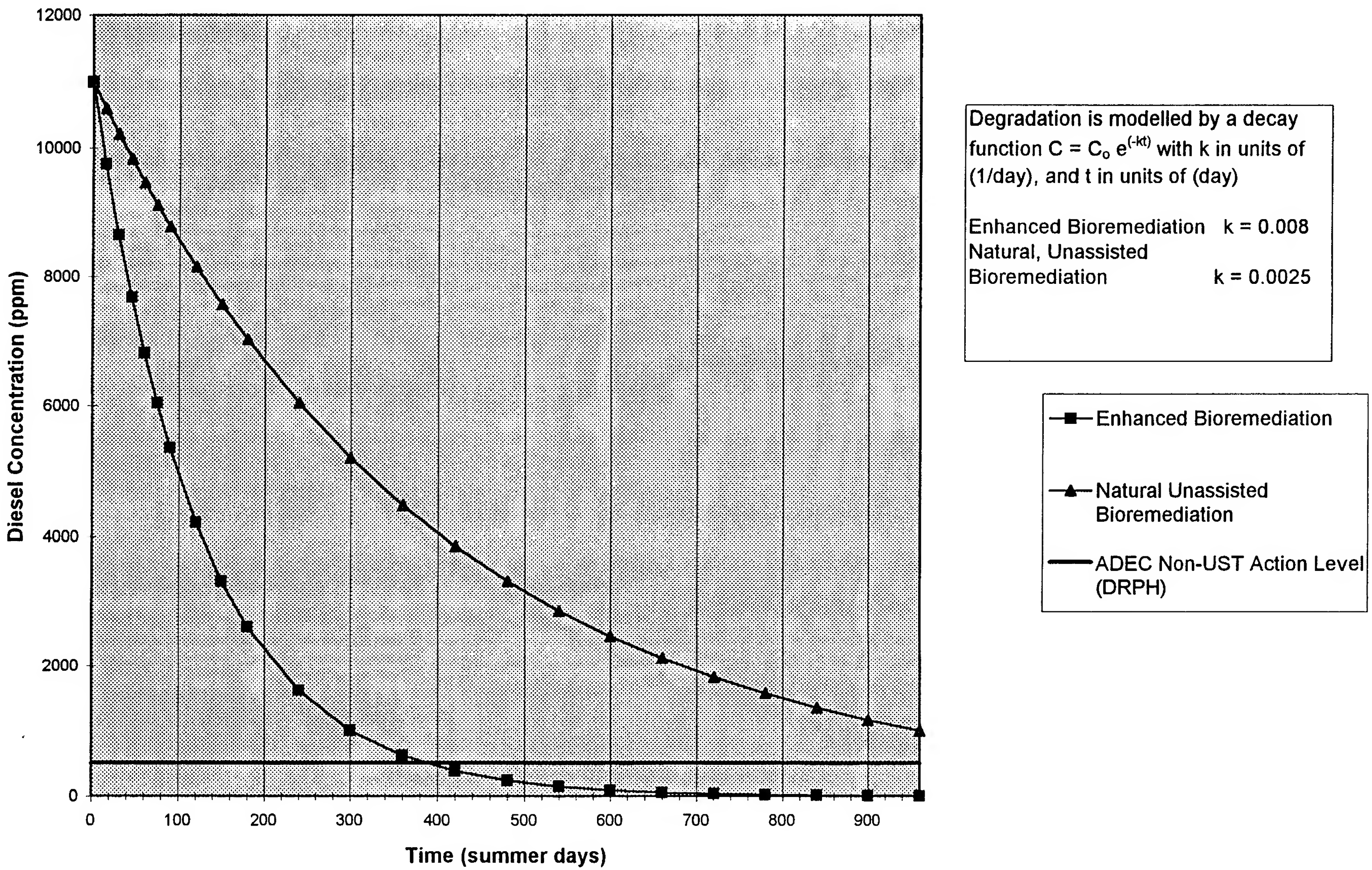
- Duration of onsite remedial activity includes all onsite activities related to conducting the remedial action: sampling, operating remedial equipment, time required adding nutrients to soil, degradation, and mobilization and demobilization (this is a quantification of the relative duration estimate); and

- Total project duration includes the duration of onsite remedial activity, as well as time required for preparing planning documents, conducting permitting activities, and closure.

6.4.1.5 Data Gaps. Data gaps include any environmental testing or treatability studies that must be done to determine the effectiveness of a given remedial alternative under site conditions.

Alternatives are analyzed comparatively in Sections 6.4.3 and 6.4.4 based on the AFCEE criteria above, and the nine criteria in the NCP, respectively. The preferred remedial alternative is identified in Section 6.4.5.

Figure 6-3. Comparative Biodegradation of Diesel Fuel in Soils
(Basis: Maximum DRPH Concentration of 11,000 ppm in Tundra at Point Barrow)



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6.4.2 Detailed Evaluation of Alternatives for the Air Terminal Area (SS03)

This section presents a detailed evaluation of remedial alternatives for Air Terminal Area (SS03). Alternatives considered for the treatment of disturbed tundra at the Air Terminal Area (SS03) at Point Barrow are:

- No action;
- Institutional controls and monitoring; and
- Enhanced bioremediation.

6.4.2.1 Successful Applications of Alternatives

No Action. As part of a study of in situ bioremediation of DRPH-contaminated gravel pads and soils near Prudhoe Bay, a control cell was left unassisted and untreated. This control cell represents, in essence, natural attenuation. Initial DRPH concentration was approximately 1,900 mg/kg. After nine weeks the DRPH concentration had decreased to 1,200 mg/kg. This indicates a reduction of 37 percent in DRPH concentration in 63 days. In addition, a slight increase in the microbial population was noted (Liddell et al. 1991). The difference between a control cell and undisturbed gravel is that the control cell material is oxygenated as is placed in the cell. As a result, the rate and magnitude of reduction is probably greater than that for undisturbed soil or gravel.

Institutional Controls and Monitoring. The bioremediation study noted above applies to this remedial alternative.

Enhanced Bioremediation. Enhanced bioremediation has been successfully implemented in the arctic environment to treat petroleum hydrocarbon contamination on the North Slope. Studies at Point Thompson and Kuparuk oil fields in Alaska show that enhanced bioremediation is a successful and efficient method for remediating and reducing the concentration of petroleum hydrocarbons to a desired level within a relatively short time. The Point Thompson case study shows that 16,000 cubic yards of TPH contaminated gravel with an initial concentration of 2,000 to 3,000 ppm was bioremediated to an average concentration of 285 ppm between July and September 1990 (Liddell et al. 1991).

The estimated remedial action efficiency of enhanced bioremediation is 94 percent based on case studies done in Alaska and estimates of biodegradation kinetics.

6.4.2.2 Project Costs. Table 6-6 is a summary of project costs for the remedial alternatives being considered for the Air Terminal Area (SS03). Detailed cost estimates for each remedial alternative are located in Attachment A.

6.4.2.3 Contaminant Reduction. The degree to which the concentrations of COCs will meet target cleanup levels (proposed remediation goals) for each alternative is summarized in Table 6-7. This measure is presented as post-remedial concentration or the initial concentration multiplied by one minus the projected efficiency (initial concentration x (1-projected efficiency)).

TABLE 6-6. SUMMARY OF PROJECT COSTS FOR REMEDIAL ALTERNATIVES EVALUATED FOR THE AIR TERMINAL AREA (SS03)

REMEDIAL ALTERNATIVE	TECHNOLOGY TESTING	CAPITAL COST	TOTAL LABOR	OPERATING COST	ENVIRONMENTAL TESTING	CLOSURE COST	ADMINISTRATIVE AND OTHER INDIRECT COSTS	PRESENT VALUE
No Action	$0	$0	$0	$0	$0	$5,000	$750	$5,750
Institutional Controls and Monitoring	$0	$100	$29,320	$15,975	$775	$4,320	$13,480	$63,970
Enhanced Bioremediation	$7,500	$18,540	$76,505	$40,875	$580	$4,320	$37,930	$186,250

TABLE 6-7. ESTIMATED POTENTIAL CONTAMINANT REDUCTION FOR THE AIR TERMINAL AREA (SS03)

REMEDIAL ACTION	CONTAMINANTS	INITIAL CONCENTRATION maximum/average* (mg/kg)	TARGET CLEANUP LEVELS (mg/kg)	POST REMEDIAL CONCENTRATION maximum/average* (mg/kg)
No Action	DRPH	11,000/2,100	500	5,500/1,050
	GRPH	1,200/580	100	600/290
Institutional Controls and Monitoring	DRPH	11,000/2,100	500	5,500/1,050
	GRPH	1,200/580	100	600/290
Enhanced Bioremediation	DRPH	11,000/2,100	500	660/120
	GRPH	1,200/580	100	70/35

* The average concentration is conservatively calculated by averaging sample results that exceed the target cleanup level (i.e., non-detects were not included).

6.4.2.4 Project Duration. A breakdown of the project durations for the remedial alternatives being considered for this site is shown in Table 6-8. Project durations are based on the assumption that, in the case of enhanced bioremediation, COC reduction to target levels will occur within four years of the start of the project or show through periodic monitoring a clear trend in that direction. This clear trend will justify site closure even if the target cleanup level has not been met. The target cleanup levels for DRPH and GRPH, again, are based on guidance and may be negotiable with ADEC. Case studies cited support this approach (see Figure 6-3).

A similar approach is taken for institutional controls and monitoring. In this case, it is assumed that natural, unassisted biodegration of COCs will show a clear trend towards the target cleanup levels based on periodic sampling that will justify site closure within four years. Project duration for no action involves closure reporting only. Detailed project duration tables for each of the alternatives considered for this medium are located in Attachment B.

6.4.2.5 Data Gaps.

No Action. The data gap is the lack of information on the biodegradation potential.

Institutional Controls and Monitoring. The data gap is the lack of information on the biodegradation potential.

Enhanced Bioremediation. The data gap is the lack of information on the biodegradation potential. A treatability study will be necessary to determine the biodegradation potential of contaminants in this medium, and to determine the type and amounts of nutrient additions to enhance biodegradation.

6.4.3 Summary of Detailed Evaluation of Remedial Alternatives

Table 6-9 summarizes the remedial alternatives evaluated for the Air Terminal Area (SS03). Costs presented in this table are based on the detailed cost sheets in Appendix A.

TABLE 6-8. ESTIMATED PROJECT DURATION FOR REMEDIAL ALTERNATIVES EVALUATED FOR THE OF AIR TERMINAL AREA (SS03)

REMEDIAL ALTERNATIVE	DURATION OF ONSITE REMEDIAL ACTIVITY (Days)	TOTAL PROJECT DURATION (Days)
No Action	0	30
Institutional Controls and Monitoring	13	881
Enhanced Bioremediation	30	988

TABLE 6-9. SUMMARY OF REMEDIAL ALTERNATIVES EVALUATED FOR THE AIR TERMINAL AREA (SS03)

REMEDIAL ACTION	CONTAMINANTS	REMEDIAL ACTION EFFICIENCY	INITIAL CONCENTRATION maximum/average* (mg/kg)	TARGET CLEANUP LEVEL (mg/kg)	POST REMEDIAL CONCENTRATION maximum/average* (mg/kg)	BENCH OR TREATABILITY STUDY REQUIRED	LEVEL OF WORKER PROTECTION	PROJECT COST	PROJECT DURATION (Months)
No Action	DRPH	50%	11,000/2,100	500	5,500/1,050	NO	D	$5,750	1
	GRPH	50%	1,200/580	100	600/290				
Institutional Controls and Monitoring	DRPH	50%	11,000/2,100	500	5,500/1,050	NO	D	$63,970	29
	GRPH	50%	1,200/580	100	600/290				
Enhanced Bioremediation	DRPH	94%	11,000/2,100	500	660/120	YES	D	$186,250	33
	GRPH	94%	1,200/580	100	70/35				

* The average concentration is conservatively calculated by averaging sample results that exceed the target cleanup level (i.e., non-detects were not included).

6.4.4 Summary of the Nine Criteria

This section consists of an evaluation of the proposed alternatives, and will be analyzed according to the following nine criteria required in the NCP:

- Overall protection of human health and the environment;
- Compliance with ARARs;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume through treatment;
- Short-term effectiveness;
- Implementability;
- Cost;
- State acceptance (not evaluated at this time); and
- Community acceptance (not evaluated at this time).

State acceptance and community acceptance will be based on comments on the RI/FS report that will detail the proposed remedial alternative for the site.

The evaluation of the nine criteria is presented in Table 6-10 for the Air Terminal Area (SS03) site. The following definitions of the nine criteria, taken from the EPA RI/FS Guidance Document and the NCP, were used.

Overall Protection of Human Health and the Environment. This criterion addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

Compliance with ARARs. This criterion addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements of federal and state environmental statutes and/or provide grounds for invoking a waiver.

Long-Term Effectiveness and Permanence. This criterion refers to the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

Reduction of Toxicity, Mobility, or Volume Through Treatment. This criterion is the anticipated performance of the treatment technologies a remedy may employ (reflects the anticipated performance of treatment).

Short-Term Effectiveness. This criterion addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

Implementability. This criterion is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

TABLE 6-10. EVALUATION OF NINE CRITERIA FOR AIR TERMINAL AREA (SS03)

MEDIUM: Tundra	No Action	Institutional Controls and Monitoring	Enhanced Bioremediation
1. Overall Protection of Human Health and the Environment	This alternative is protective of human health and the environment because it complies with action and location specific ARARs, provides long-term effectiveness and permanence, and provides short-term effectiveness.	This alternative is protective of human health and the environment because it complies with action and location specific ARARs, provides long-term effectiveness and permanence, and provides short-term effectiveness.	This alternative is protective of human health and the environment because it complies with all ARARs, provides long-term effectiveness and permanence, and provides short-term effectiveness.
2. Compliance with ARARs	The use of this technology will comply with action specific and location specific ARARs but may not provide enough reduction to comply with chemical specific ARARs.	The use of this technology will comply with action specific and location specific ARARs but may not be enough reduction to comply with chemical specific ARARs.	The use of this technology will comply with all chemical specific, action specific, and location specific ARARs.
3. Long-Term Effectiveness and Permanence	This alternative provides sufficient long-term effectiveness because the residual COC concentrations are below relevant risk and hazard levels. It provides permanence because COCs are irreversibly transformed to non-hazardous by-products.	This alternative provides sufficient long-term effectiveness because the residual COC concentrations are below relevant risk and hazard levels. It provides permanence because COCs are irreversibly transformed to non-hazardous by-products.	This alternative provides sufficient long-term effectiveness because the residual COC concentrations are below relevant risk and hazard levels and are below relevant action levels. It provides permanence because COCs are irreversibly transformed to non-hazardous by-products.
4. Reduction of Toxicity, Mobility, and Volume Through Treatment	Results in a reduction in toxicity through natural biodegradation.	Results in a reduction in toxicity through natural biodegradation.	Results in a reduction in toxicity through treatment.
5. Short-Term Effectiveness	This alternative will not present any detrimental effect on the environment, the surrounding community, or workers. Recommended worker protection is level D.	This alternative will not present any detrimental effect on the environment, the surrounding community, or workers. Recommended worker protection is level D.	This alternative will not present any detrimental effect on the environment, the surrounding community, or workers. Recommended worker protection is level D.
6. Implementability	This alternative should be technically and administratively implementable, provided that a risk management decision is made that COC concentrations do not warrant monitoring.	This alternative is technically and administratively implementable.	Technical implementability will be determined by performing a treatability study. Administrative implementability issues include securing permits. Materials are readily available.
7. Cost	$5,750	$63,970	$186,250

TABLE 6-10. EVALUATION OF NINE CRITERIA FOR AIR TERMINAL AREA (SS03) (CONTINUED)

MEDIUM: Tundra	No Action	Institutional Controls and Monitoring	Enhanced Bioremediation
8. State/Support Agency	ADEC will be involved in review and selection of remedial alternatives.	ADEC will be involved in review and selection of remedial alternatives.	ADEC will be involved in review and selection of remedial alternatives.
9. Community Acceptance	Community Relations Plan is being implemented and community concerns will be addressed in a responsiveness summary.	Community Relations Plan is being implemented and community concerns will be addressed in a responsiveness summary.	Community Relations Plan is being implemented and community concerns will be addressed in responsiveness summary.

Cost. Cost includes estimated capital and operation and maintenance costs, and net present work costs.

State Acceptance. State acceptance addresses the technical or administrative issues and concerns the support agency may have regarding each alternative.

Community Acceptance. Community acceptance addresses the issues and concerns the public may have regarding each of the alternatives.

6.4.5 Preferred Alternative

The preferred alternative for the tundra at the Air Terminal Area (SS03) is enhanced bioremediation. Enhanced bioremediation can achieve the target cleanup levels for DRPH in less than four years assuming 100 summer days per year (see Figure 6-3). No action and institutional controls and monitoring can achieve target cleanup levels for DRPH in approximately ten years (see Figure 6-3), though the average site-wide DRPH concentration is expected to achieve target cleanup levels in a much shorter time period. There are only a few limited areas at the site where the DRPH and GRPH concentrations exceed ADEC guidance cleanup levels. The average site-wide concentrations will probably be less than target cleanup levels through natural bioremediation in approximately two years. Therefore, if the ADEC Non-UST soil cleanup levels can be negotiated upwards, the preferred alternative is no action because there is no other reason to take remedial action. If it is not possible to negotiate the Non-UST soil cleanup levels, the preferred alternative is enhanced bioremediation because it will meet the target cleanup levels for DRPH and GRPH in a more timely manner. Institutional controls and monitoring may be a negotiated compromise.

Estimated cost for performing the preferred alternative is as follows:

- Enhanced bioremediation (SS03) $186,250

If no action can be negotiated:

- No action (SS03) $ 5,750

6.5 SITING STUDY

Siting of remedial equipment should not be a major concern at Point Barrow, since no large remedial units will be used. Enhanced bioremediation does not require a significant staging area.

ATTACHMENT A
COST ESTIMATES

Alternative: No Action

Estimated Costs

Site:	Medium:	Tundra
Air Terminal Area (SS03)	Total volume:	30,000 CY
	Project duration:	1 Month (30 days)
	Discount rate:	5% *

Description	Quantity	Units	Unit Cost	Fixed Cost	Annual Cost
CAPITAL COSTS:					
Total Capital Cost over the 1 Month Project				$0	$0
OPERATING COSTS:					
Closure	1	Event	$5,000.00	$5,000	
Total Operating Cost over the 1 Month Project				$5,000	$0
Total Direct Cost over the 1 Month Project				$5,000	$0
Procurement costs (0%)				$0	$0
Overhead (10%)				$500	$0
Contingency (5%)				$250	$0
Total Administrative Cost over the 1 Year Project				$750	$0
NET PRESENT WORTH					$5,750

* Estimated discount rate for calculating present value of future costs

Alternative: Institutional Controls and Monitoring
Estimated Costs

Site:	Medium:	Tundra	
Air Terminal Area (SS03)	Total volume:	30,000 CY	
	Project duration:	29 Months	(881 days)
	Discount rate:	5% *	

Description	Quantity	Units	Unit Cost	Fixed Cost	Annual Cost
CAPITAL COSTS:					
Planning Documents (Work plan, SAP, QAPjP, H&S)	2	Draft	$5,000.00	$10,000	
Misc. Equipment and Supplies	1	Amount	$100.00	$100	
Total Capital Cost over the 29 Month Project				$10,100	$0
OPERATING COSTS:					
Implement Institutional Controls	1	Event	$10,000.00	$10,000	
Sampling (initial)	1	Event	$280.00	$280	
Sampling (annual)	2	Event	$280.00		$560
Labor	240	Hr	$70.00	$16,800	
Per Diem	22	Days	$175.00	$3,850	
Project Management	36	Hr	$70.00	$2,520	
Closure (Month 29)	1	Report	$5,000.00		$5,000
Travel for Sampling	4	Trips	$1,200.00		$4,800
Total Operating Cost over the 29 Month Project				$33,450	$10,360
Total Direct Cost over the 29 Month Project				$43,550	$10,360
Procurement costs (5%)				$2,178	$518
Overhead (10%)				$4,355	$1,036
Contingency (10%)				$4,355	$1,036
Total Administrative Cost over the 29 Month Project				$10,888	$2,590
NET PRESENT WORTH					**$63,968**

* Estimated discount rate for calculating present value of future costs

Alternative: Enhanced Bioremediation

Estimated Costs

Site:	Medium:	Tundra	
Air Terminal Area (SS03)	Total volume:	30,000 CY	
	Project duration:	33 Months	(988 days)
	Discount rate:	5% *	

Description	Quantity	Units	Unit Cost	Fixed Cost	Annual Cost
CAPITAL COSTS:					
Planning Documents (RD/RA) (Work plan, SAP, QAPjP, H&S)	3	Report	$5,000.00	$15,000	
Develop Specifications (30%, 95%, 100%)	3	Report	$5,000.00	$15,000	
Permitting (Air & Water)	2	Event	$2,000.00	$4,000	
Treatability study	1	Study	$7,500.00	$7,500	
Compressor	2	Month	$2,000.00	$4,000	
Nutrients	12,000	Lb	$1.00	$12,000	
Empty sand bags	143	Bag	$0.47	$67	
Hose	1	Hose	$50.00	$50	
Booms	5	Boom	$24.53	$123	
Trash pump	2	Month	$420.00	$840	
Personal H & S Expendibles	46	Day	$10.00	$460	
Misc. Equipment and Supplies	1	Lump Sum	$1,000.00	$1,000	
Total Capital Cost over the 33 Month Project				$60,040	$0
OPERATING COSTS:					
Mobilize/Demobilize	1	Event	$30,000.00	$30,000	
Transport (Nutrients)					
Transport Equipment					
Labor	528	Hr	$70.00	$36,960	
Per diem	50	Day	$175.00	$8,750	
Sampling & Analysis (initial)	3	Sample	$70.00	$210	
Sampling & Analysis (annual)	2	Event	$210.00		$420
Travel for Sampling	4	Trips	$1,200.00		$4,800
Project Management	79	Hr	$70.00	$5,544	
Closure (Month 33)	1	Report	$5,000.00		$5,000
Total Operating Cost over the 33 Month Project				$81,464	$10,220
Total Direct Cost over the 33 Month Project				$141,504	$10,220
Procurement costs (5%)				$7,075	$511
Overhead (10%)				$14,150	$1,022
Contingency (10%)				$14,150	$1,022
Total Administrative Cost over the 33 Month Project				$35,376	$2,555
NET PRESENT WORTH					**$186,251**

* Estimated discount rate for calculating present value of future costs

ATTACHMENT B
ESTIMATED DURATION

Alternative: No Action
Estimated Project Duration

Site:
Air Terminal Area (SS03)

Start Date: Day 1
Medium: Tundra

Activity	Duration	Start Date	End Date
Develop Closure Report	30 Days	Day 1	Day 30
Secure Closure	0 Days	Day 30	Day 30
PROJECT DURATION	30 Days		

Alternative: Institutional Controls and Monitoring
Estimated Project Duration

Site:
Air Terminal Area (SS03)

Start Date: Day 1
Medium: Tundra

Activity	Duration	Start Date	End Date
Development of Planning Documents	60 Days	Day 1	Day 60
Implementation of Institutional Controls	60 Days	Day 61	Day 120
Mobilization	2 Days	Day 121	Day 122
Preliminary Sampling	3 Days	Day 123	Day 125
Demobilization	2 Days	Day 126	Day 127
End of First Year Sampling	3 Days	Day 487	Day 489
End of Second Year Sampling	3 Days	Day 849	Day 851
Development of Closure Report	30 Days	Day 852	Day 881
Secure Closure	0 Days	Day 881	Day 881
PROJECT DURATION	881 Days		

Alternative: Enhanced Bioremediation
Estimated Project Duration

Site:
Air Terminal Area (SS03)

Start Date: Day 1
Media: Tundra

Activity	Duration	Start Date	End Date
Perform Treatability Study	60 Days	Day 1	Day 60
Development of Planning Documents	90 Days	Day 61	Day 150
Development of Specifications	60 Days	Day 61	Day 120
Secure Permits	60 Days	Day 151	Day 210
Mobilization	7 Days	Day 211	Day 217
Preliminary Sampling	3 Days	Day 218	Day 220
Application of Nutrients and Water	7 Days	Day 221	Day 227
Demobilize	7 Days	Day 228	Day 234
End of First Year Sampling	3 Days	Day 594	Day 596
End of Second Year Sampling	3 Days	Day 956	Day 958
Develop Closure Report	30 Days	Day 959	Day 988
Secure Closure	0 Days	Day 988	Day 988
PROJECT DURATION	988 Days		

APPENDIX A

REFERENCES AND LIST OF ACRONYMS, ABBREVIATIONS, AND UNITS OF MEASUREMENT

REFERENCES

Alaska Biological Research. 1994. Spectacled and Steller's Eiders Surveys at 11CEOS Remote Sites in Alaska, 1994. Fairbanks, Alaska. 30 September 1994.

Alaska Consultants, Inc. 1983. Background for Planning, City of Barrow. Prepared for the North Slope Borough.

Alaska Department of Environmental Conservation. 1991. Interim Guidance for Non-UST Contaminated Soil Cleanup Levels. Guidance Number 001, Revision 1. Alaska Department of Environmental Conservation, Juneau, Alaska. July 17, 1991.

Alaska Division of Geological and Geophysical Survey. 1984. Alaska Heritage Resource Survey Records.

American Cancer Society. 1993. Cancer Facts and Figures - '93. American Cancer Society, Atlanta, Georgia.

American Geological Institute. 1972. Glossary of Geology. Washington, D.C.

APHA, AWWA. 1989. Standard Methods for the Examination of Water and Wastewater. 17th Edition.

Atlas, R.M. 1985. Effects of Hydrocarbons on Microorganisms and Petroleum Biodegradation in Arctic Ecosystems. F.R. Engelhardt, Ed. Petroleum Effects in the Arctic Environment. Canada Oil and Gas Lands Administration, Ottawa, Ontario, Canada.

Bergman, R.D., R.L. Howard, K.F. Abraham, and M.W. Weller. 1977. Water Birds and their Wetland Resources in Relation to Oil Development at Storkersen Point, Alaska. U.S. Fish and Wildlife Service Resource Publication 129. Washington, D.C.

CH2M Hill. 1981. Installation Restoration Program Search, Alaska DEW Line Stations. Prepared for the U.S. Air Force.

Delorme Mapping. 1992. Alaska Atlas and Gazetteer. First Edition. Second Printing.

Dingman, S.L., R.G. Barry, G. Weller, C. Benson, E.F. LeDrew, and C. Goodwin. 1980. Climate, Snow Cover, Microclimate, and Hydrology. In J. Brown et al. (Eds.), An Arctic Ecosystem: The Coastal Tundra at Barrow, Alaska. US/IBP Synthesis Series No. 12. Dowden, Hutchinson, and Ross. Stroudsburg, Pennsylvania.

Evans, D., R. Elder, and R. Hoffman. 1992. Bioremediation of Diesel Contamination Associated with Oil and Gas Operations. Gas, Oil, and Environmental Biotechnology IV.

REFERENCES (CONTINUED)

Feulner, A.J., J.M. Childers, and V.W. Norman. 1971. Water Resources of Alaska. U.S. Geological Survey Open-File Report 71-105.

Grantz, A., P.W. Barnes, D.A. Dinter, M.B. Lynch, E. Reminitz, and E.W. Scott. 1980. Geologic Framework; Hydrocarbon Potential, Environmental Conditions, and Anticipated Technology for Exploration and Development of the Beaufort Shelf North of Alaska. U.S. Geological Survey Open-File Report 80-94.

Grantz, A., P.W. Barnes, D.A. Dinter, M.B. Lynch, E. Reminitz, and E.W. Scott. 1982. Geologic Framework; Hydrocarbon Potential and Environmental Conditions for Exploration and Development of Proposed Oil and Gas Lease Sale in the Beaufort and Northeast Chukchi Seas. U.S. Geological Survey Open-File Report 82-48.

Hart Crowser. 1987. Environmental Assessment for North Warning System. Alaska.

Hull, R.N. and G.W. Suter II. 1994. Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Sediment Associated Biota: 1994 Revision. ORNL Environmental Restoration Program. ES/ER/TM-95/R1.

Hussey, K.M. and R.W. Michaelson. 1966. Tundra Relief Features Near Point Barrow, Alaska. Arctic. V. 19, pp. 162-184.

Jacobson, M.J. and C. Wentworth. 1982. Kaktovik Subsistence: Land Use Values Through Time in the Arctic National Wildlife Refuge Area. U.S. Fish and Wildlife Service, Northern Alaska Ecological Services, Fairbanks.

Jorgenson, M.T., L. Krizan, and M. Joyce. 1991. Bioremediation and Tundra Restoration After an Oil Spill in the Kuparuk Oil Field, Alaska, 1990. Conference Paper, Environ Canada Arctic & Marine Oil Spill program, 14th Technical Seminar, Vancouver, B.C.

Jorgenson, M.T., T. Carter, M. Royce, and S. Ronzio. 1992. Cleanup and Bioremediation of a Crude-Oil Spill at Prudhoe Bay, Alaska.

Liddell, B.V., D.R. Smallbeck, and P.C. Ramert. 1991. Arctic Bioremediation: A Case Study. Proceedings of the 1991 SPE Annual Technical Conference and Exhibition.

Lindsay, W.L. 1979. Chemical Equilibria in Soils. John Wiley and Sons, New York, New York. 449 pp.

Livingstone, D.A. 1954. On the Orientation of Lake Basins. American Journal of Science. V. 252, pp. 547-554.

REFERENCES (CONTINUED)

Manahan, S.E. 1991. Environmental Chemistry. Lewis Publishers, Inc., Chelsea, Minnesota. Pp. 45-47.

Miller, M.C., R.T. Prentki, and R.J. Barsdale. 1980. Chapter 3 - Physics. In J.E. Hobbie (Ed.), Limnology of Tundra Ponds, Barrow, Alaska. Dowden, Hutchinson, and Ross, Inc., Stroudsburg, Pennsylvania.

National Petroleum Reserve in Alaska Task Force. 1978. 105(c) Land Use Study, Volume 2: Values and Resources Analysis. U.S. Department of the Interior. Anchorage, Alaska.

National Petroleum Reserve in Alaska Task Force. 1979. 105(c) Final Study, Volume 1: Summaries of Studies. U.S. Department of the Interior. Anchorage, Alaska.

Opresko, D.M., B.E. Sample, and G.W. Suter II. 1994. Toxicological Benchmarks for Wildlife: 1994 Revision. ORNL Environmental Restoration Program. ES/ER/TM-~~95~~/R1.
86

Pewe, Troy L. 1975. Quaternary Geology of Alaska. U.S. Geological Survey Professional Paper 835.

Ratliff, M.D. 1993. Construction and Operation of a Biological Treatment Cell for the Treatment of Hydrocarbon-Contaminated Soil in Alaska. Society of Petroleum Engineers, Conference Paper SPE 25998; SPE/EPA, Exploration & Production Environmental Conference. San Antonio, Texas.

Robertson, Scott B. 1988. Hydrology of Arctic Wetlands. ASWM Technical Report, p. 262-269.

Selkregg, L.L. 1975. Alaska Regional Profiles. Volume II Arctic Region.

Shannon and Wilson, Inc. 1991. Final Report Supplemental Remedial Investigation for the Comprehensive Long-Term Environmental Action (Navy Clean Program) Northwest Area. April.

Song, Hong-Gyu, X. Wang, and R. Bartha. 1990. Bioremediation Potential of Terrestrial Fuel Spills. Applied and Environmental Microbiology, 56(3)652-656.

Suter, G.W. and J.B. Mabrey. 1994. Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1994 Revision. Environmental Sciences Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Tesoro/PES. 1992. Tesoro, Inc. Vendor Brochure.

Tesoro/PES. 1993. Tesoro, Inc. Vendor Brochure.

REFERENCES (CONTINUED)

U.S. Air Force. 1987. Real Estate Map Point Barrow LRR Site, Alaska (Updated 1990).

U.S. Air Force. 1991. Handbook to Support the Installation Restoration Program (IRP) Statements of Work. Installation Restoration Program Division, Human Systems Program Office, Human Systems Division, Brooks Air Force Base, Texas (May 1991).

U.S. Air Force. 1993a. Work Plan for DEW Line and Cape Lisburne Radar Stations. Delivery Order 22. Prepared for Air Force Center for Environmental Excellence, Brooke Air Force Base, Texas. Prepared by ICF Technology, Inc.

U.S. Air Force. 1993b. Sampling and Analysis Plan DEW Line and Cape Lisburne Radar Stations. Delivery Order 22. Prepared for Air Force Center for Environmental Excellence, Brooke Air Force Base, Texas. Prepared by ICF Technology, Inc.

U.S. Air Force. 1993c. Health and Safety Plan DEW Line and Cape Lisburne Radar Stations. Delivery Order 22. Prepared for Air Force Center for Environmental Excellence, Brooke Air Force Base, Texas. Prepared by ICF Technology, Inc.

U.S. Air Force. 1996. Final Risk Assessment, Point Barrow Radar Installation, Alaska. Delivery Order 22. Prepared for Air Force Center for Environmental Excellence, Brooke Air Force Base, Texas. Prepared by ICF Technology, Inc. 19 February.

U.S. Bureau of the Census. 1991. 1990 Number of Inhabitants. U.S. Department of Commerce Report, Washington, D.C.

U.S. Environmental Protection Agency. 1983. Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020. March 1983.

U.S. Environmental Protection Agency. 1986. Test Methods for Evaluating Solid Waste (Physical Chemical Methods). Third Edition, EPA SW-846, September 1986.

U.S. Environmental Protection Agency. 1989a. Laboratory Data Validation Guidelines for Evaluating Inorganic Analyses. EPA Hazardous Site Evaluation Division. October 1989.

U.S. Environmental Protection Agency. 1989b. Risk Assessment Guidance for Superfund, Human Health Evaluation Manual, Part A. Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C.

U.S. Environmental Protection Agency. 1990. Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses. EPA Hazardous Site Evaluation Division. December 1990.

REFERENCES (CONTINUED)

U.S. Environmental Protection Agency. 1991a. Region 10 Supplemental Risk Assessment Guidance for Superfund. Region 10, U.S. Environmental Protection Agency, Seattle, Washington (August 16, 1991).

U.S. Environmental Protection Agency. 1991b. Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions. Office of Solid Waste and Emergency Response. Washington D.C. 22 April 1991.

U.S. Environmental Protection Agency. 1991c. Human Health Evaluation Manual, Part B: Development of Risk-Based Preliminary Remediation Goals. Office of Solid Waste and Emergency Response. Washington D.C. December 13, 1991.

U.S. Environmental Protection Agency. 1992. Framework for Ecological Risk Assessment. U.S. Environmental Protection Agency, Washington D.C. (February 1992).

U.S. Environmental Protection Agency. 1994. Ecological Risk Assessment Guidance for Superfund. Process for Designing and Conducting Ecological Risk Assessments. USEPA Environmental Response Team, Edison, New Jersey. September 26, 1994. Review Draft.

U.S. Geologic Survey. 1955 (minor revisions 1973). Barrow (B-4) Quadrange, Alaska-North Slope Borough, 1:63,360 Series (Topographic).

Wahrhaftig, Clyde. 1965. Physiographic Divisions of Alaska. U.S. Geological Survey Professional Paper 482.

Walker, D.A., K.R. Everett, P.J. Webber, and J. Brown. 1980. Geobotanical Atlas of the Prudhoe Bay Region, Alaska. U.S. Army Corps of Engineers, Cold Regions Research and Engineering Laboratory, Report 80-14.

Washington State Department of Ecology. 1992. Total Petroleum Hydrocarbons Analytical Methods of Soil and Water, April 1992.

Williams, John R. 1970. Ground Water in the Permafrost Regions of Alaska. U.S. Geological Survey Professional Paper 696.

Woodward-Clyde Consultants. 1987. Technical Support Document for Record of Decision, POW-M Dew Line Site. Final Report.

Young, F.J. 1979. Soils of the Barrow Area. U.S. Department of Agriculture, Soil Conservation Service.

LIST OF ACRONYMS, ABBREVIATIONS, AND UNITS OF MEASUREMENT

ADEC	Alaska Department of Environmental Conservation
Air Force	United States Air Force
AFCEE	Air Force Center for Environmental Excellence
AMSL	Above Mean Sea Level
ANILCA	Alaska National Interest Lands Conservation Act of 1980
ARARs	Applicable or Relevant and Appropriate Requirements
ATV	All-Terrain Vehicles
BTEX	Benzene, Toluene, Ethylbenzene, and Xylene
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
COC	Chemical of Concern
CT&E	Commercial Testing and Engineering, Inc.
DEQPPM	Defense Environmental Quality Program Policy Memorandum
DOD	Department of Defense
DRO	Diesel Range Organics
DRPH	Diesel Range Petroleum Hydrocarbons
EPA	U.S. Environmental Protection Agency
ERA	Ecological Risk Assessment
F&B	Friedman & Bruya, Inc.
FS	Feasibility Study
FWPCA	Federal Water Pollution Control Act
GC	Gas Chromatograph
GC/MS	Gas Chromatography/Mass Spectrometry
GRA	General Response Action
GRO	Gasoline Range Organics
GRPH	Gasoline Range Petroleum Hydrocarbons
HQ	Hazard Quotient
HVOC	Halogenated Volatile Organic Compound
ICP	Inductively Coupled Plasma
IDW	Investigation Derived Waste
IRP	Installation Restoration Program
MCL	Maximum Contaminant Level
NCP	National Contingency Plan
NPL	National Priority List
QAPjP	Quality Assurance Project Plan
QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
PCBs	Polychlorinated Biphenyls

LIST OF ACRONYMS, ABBREVIATIONS, AND UNITS OF MEASUREMENT (CONTINUED)

RAGS	Risk Assessment Guidance for Superfund
RBSLs	Risk-Based Screening Levels
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RRPH	Residual Range Petroleum Hydrocarbons
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act of 1986
SOPs	Standard Operating Procedures
SVOC	Semi-Volatile Organic Compound
TCLP	Toxicity Characteristic Leaching Procedure
TDS	Total Dissolved Solids
TOC	Total Organic Carbon
TRV	Toxicity Reference Value
TSS	Total Suspended Solids
UCL	Upper Confidence Limit
VOC	Volatile Organic Compound

MEASUREMENTS

µg/L	micrograms per liter
mg/kg	milligrams per kilogram
ppm	parts per million

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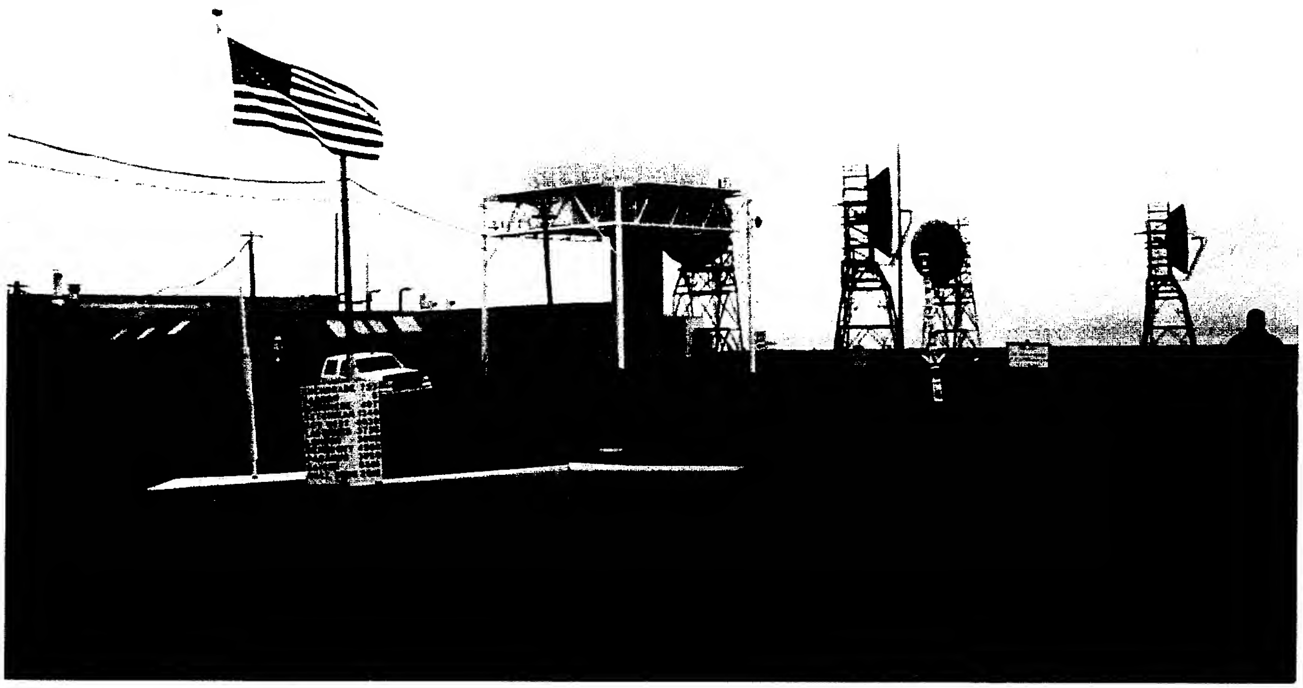
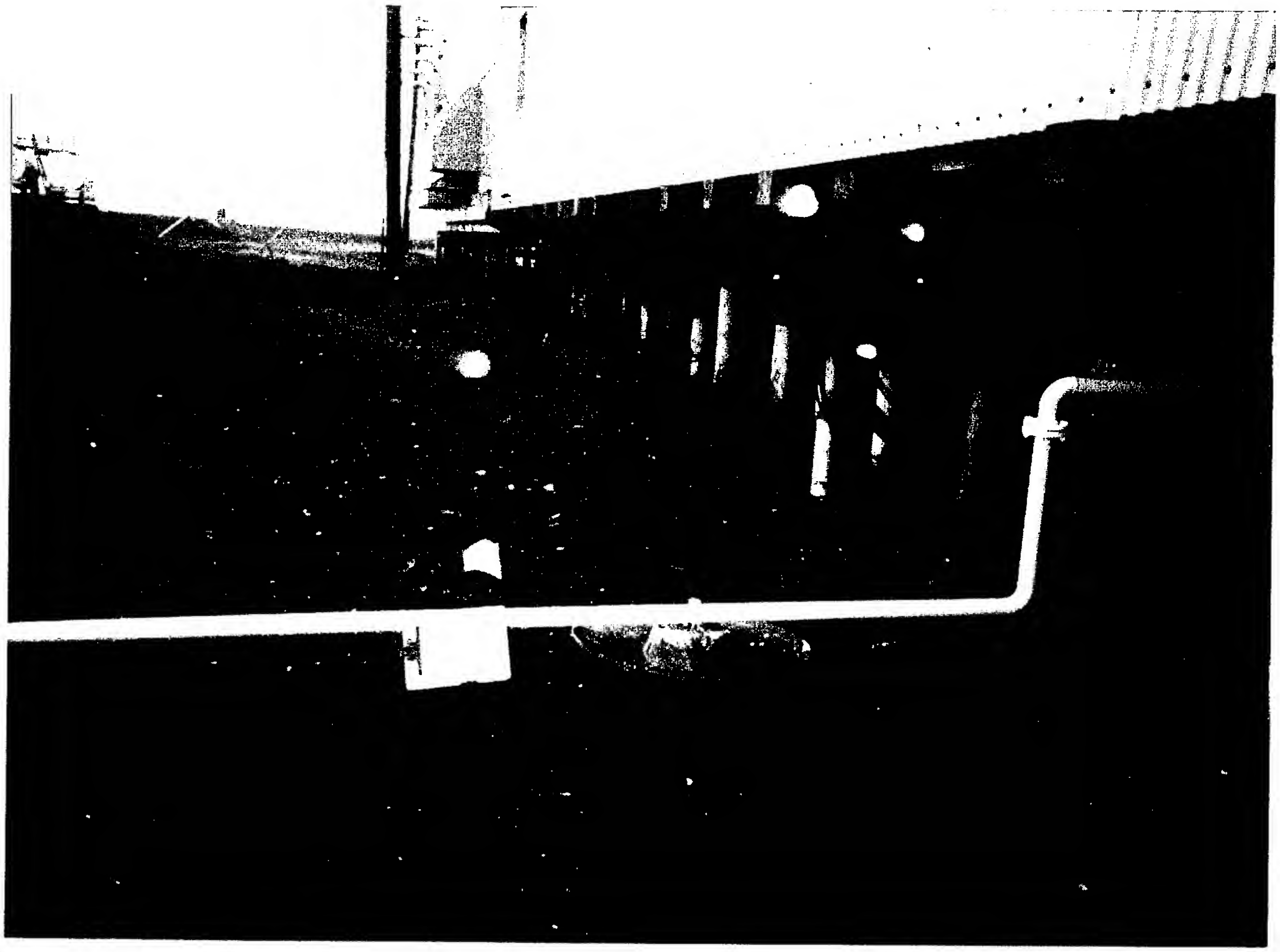
APPENDIX B

PHOTOGRAPHS OF POINT BARROW RADAR INSTALLATION AND SITES



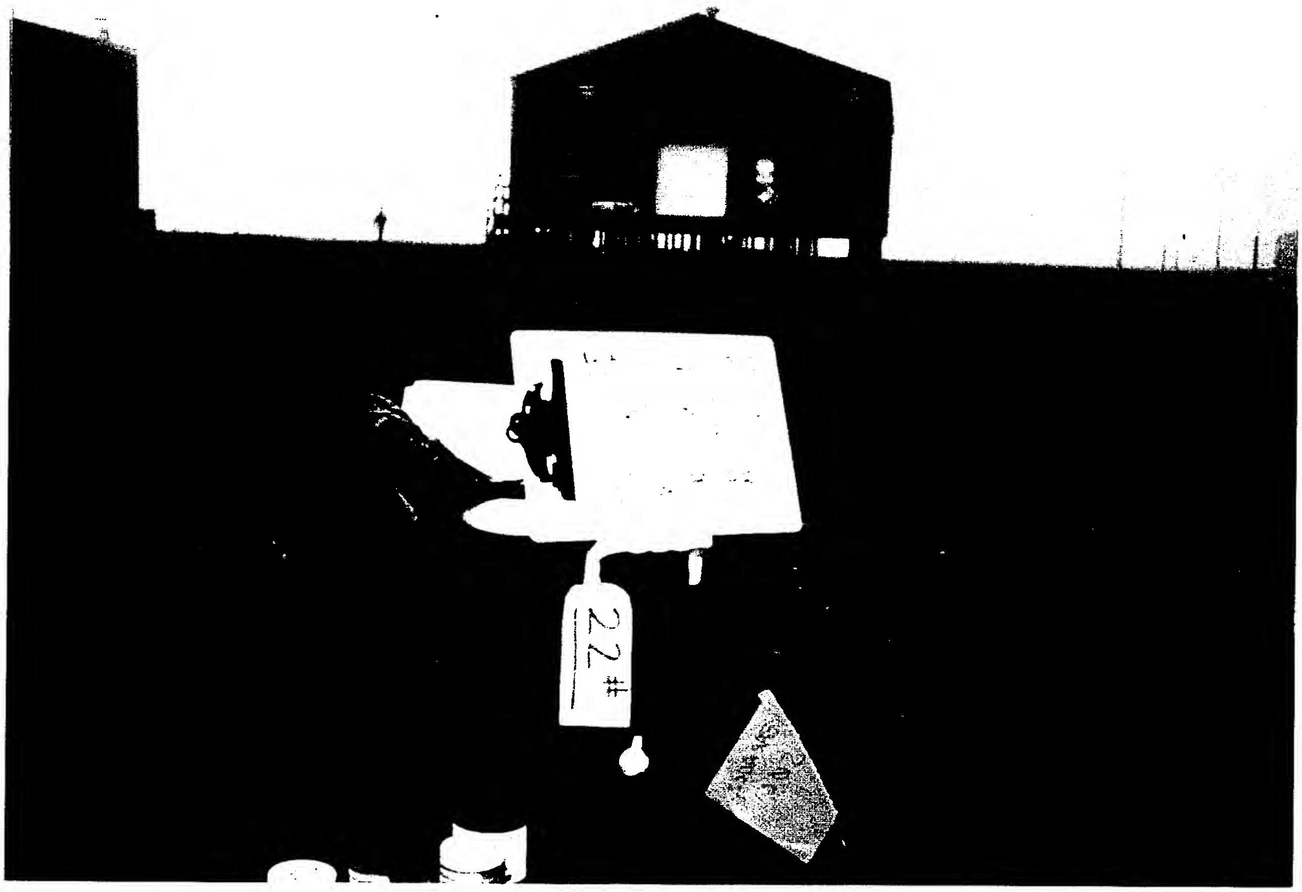
A view to the southeast of the Point Barrow radar installation.

A view to the southwest of a tundra pond in the Diesel Fuel Spill (SS01) area. The west end of module train B is located to the left in this photo.



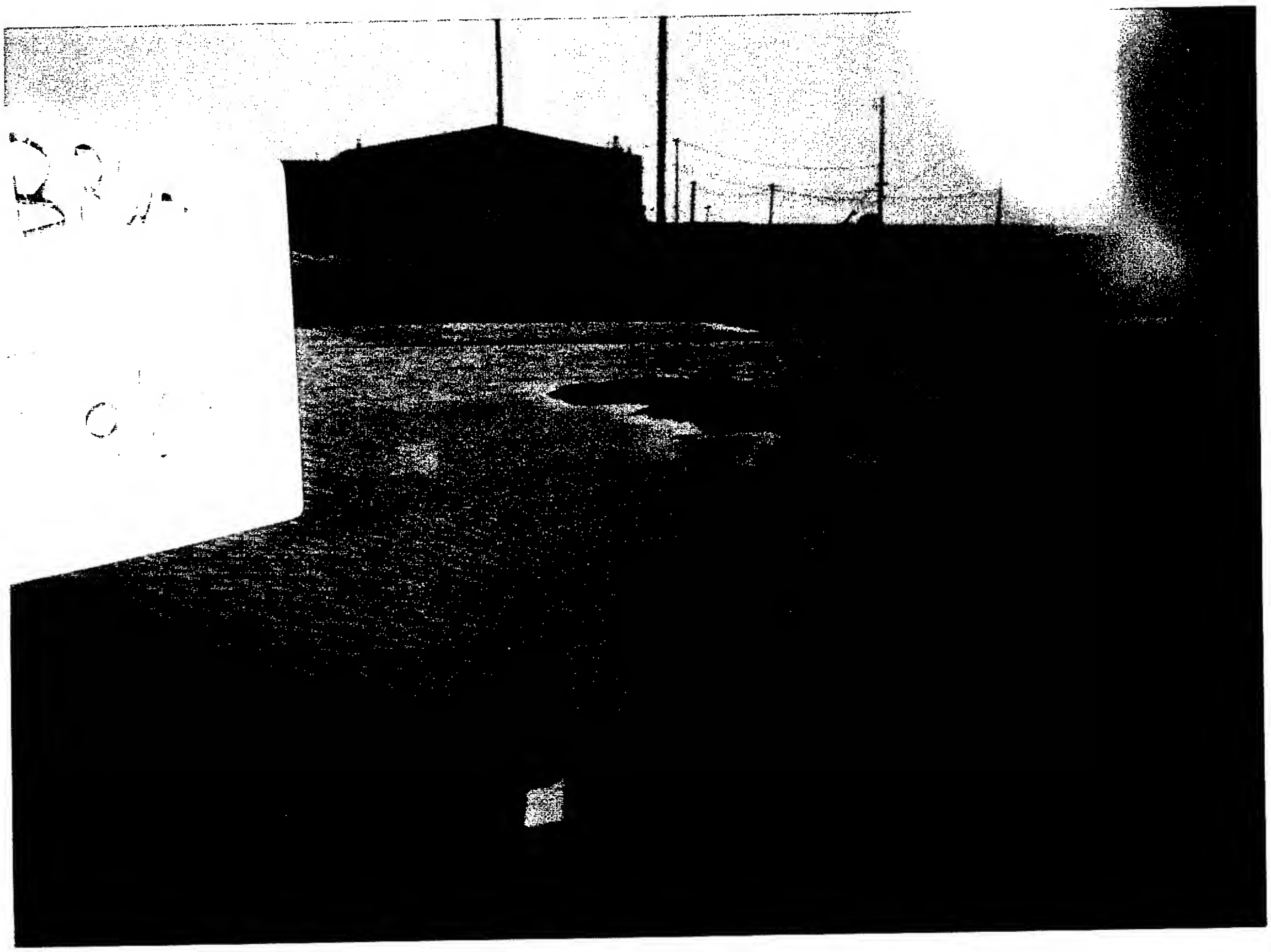
A view to the west of the south side of module train B. The source of contaminants at the Diesel Fuel Spill (SS01) site is suspected to be from diesel spills in this area of the module train.

A view to the east of the west end of the Garage (SS02).



A view to the south of the Air Terminal Building at the Air Terminal Area (SS03) site. The hangar can be seen in the left side of the photo.

A view to the west of the east side of the hangar in the Air Terminal Area (SS03) site. Nine samples were collected in the tundra and ponded areas located east of the hangar.



Ponded areas south of the hangar at the Air Terminal Area (SS03) site.

APPENDIX C

COPY OF THE TASK DESCRIPTIONS AND STATEMENT OF WORK

REF 55X

ORDER FOR SUPPLIES OR SERVICES

1. PAGE 1 OF 3

2. PROC INSTRUMENT ID NUMBER (PIN): F33615-90-D-4010
MARK ALL PACKAGES AND PAPERS WITH THIS NUMBER

3. CALL/ORDER NUMBER: 0022

4. DATE OF ORDER*: 8 APR 1993

5. REQUISITION/PURCHASE REQUEST PROJECT NUMBER: FY7624-93-08202

6. CERTIFIED FOR NATIONAL DEFENSE UNDER DOC REG 2/DMS REG 1 RATING: DO-C9

7. ISSUED BY — CODE FQ2826
DEPARTMENT OF THE AIR FORCE
AIR FORCE MATERIEL COMMAND
HUMAN SYSTEMS CENTER/PK
8005 9TH STREET
BROOKS AFB TX 78235-5353
BUYER: EDWIN CUSTODIO/HSC-PKVBA
PHONE: (210) 536-4493

8. ADMINISTERED BY — CODE S2101A
DCASMA BALTIMORE
200 TOWSONTOWN BLVD, WEST
TOWSON MD 21204-5299

9. CONTRACTOR NAME AND ADDRESS — CODE 69148 — FACILITY CODE — IF "X" FOR MULTIPLE FACILITIES SEE SECT "G"
ICF TECHNOLOGY, INC
9300 LEE HIGHWAY
FAIRFAX VA 22031-1207

PHONE: (703) 934-3000
COUNTY: FAIRFAX

10. MAIL INVOICES TO: U

11. DISCOUNT FOR PROMPT PAYMENT
1ST N ___ % ___ DAYS
2ND ___ % ___ DAYS
3RD ___ % ___ DAYS
NET DAYS ___ OTHER — IF "X" SEE SECT "G"

12A. PURCHASE OFFICE POINT OF CONTACT: MVH/M6V/MVY

12B. RESERVED FOR SERVICE/AGENCY USE

13. PAYMENT WILL BE MADE BY — CODE S3910A — IF "X" SEE SECT "G"
DCASR, PHILADELPHIA
P.O. BOX 7730
PHILADELPHIA, PA 19101-7478

14. TYPE CONTRACTOR: A

15. SECURITY A. CLASSIFICATION: U — B. DATE OF DD 254

16. CONTRACT ADMINISTRATION — A. FAST PAY — B. CONTRACT (1) KIND I (2) TYPE Y — C. ABSTRACT RECIP ADP POINT — D. SPL CONT PROVISIONS — E. CONT ADMIN FUND LMT

17. (RESERVED)

18. SVC/AGENCY USE

19. SURV. CRIT: C

20. TOTAL AMOUNT: NOT-TO-EXCEED $299,855.00

21. APPROPRIATION AND ACCOUNTING DATA
A. ACTY CLAS: U — B. ACRN: AA — C. APPROPRIATION: 5733400 — D. LIMIT SUBHEAD
E. SUPPLEMENTAL ACCOUNTING CLASSIFICATION
F. OPN RECIPIENT DODAAD: F74400 — G. OBLIGATION AMOUNT: $299,855.00
H. NON-DOD/MILSBILLS PAYMENT/FROM: 303 7434 434419 00007 53440 78008F 674400
I. SVC AGENCY USE: FY7624-93-08202

22A. TYPE OF ORDER

DELIVERY	X	B. NON-DOD CONTRACT NUMBER. This delivery order is subject to instructions contained on this side of form only and is issued in accordance with and subject to terms and conditions of above numbered contract, or Non-DOD Contract Number.
PURCHASE		Reference your ___ Furnish the following on terms specified herein.

If quantity accepted by the Government is same as quantity ordered, indicate by mark. If different, enter actual quantity accepted below quantity ordered and encircle.

23. UNITED STATES OF AMERICA
BY: GARY J. MACDECKY — Gary J. Macdecky 93APR08
NAME OF CONTRACTING/ORDERING OFFICER AND DATE (YYMMDD)

24. TOTAL — 25. DIFFERENCES

25. QUANTITY ORDERED HAS BEEN
☐ INSPECTED ☐ RECEIVED ☐ ACCEPTED, AND CONFORMS TO THE CONTRACT EXCEPT AS STATED

26. SHIP NUMBER — ☐ PARTIAL ☐ FINAL

27. D.O. VOUCHER NUMBER

28. INITIALS

DATE — SIGNATURE OF AUTHORIZED GOVERNMENT REPRESENTATIVE

29. I CERTIFY THIS AMOUNT IS CORRECT AND PROPER FOR PAYMENT
SIGNATURE AND TITLE OF CERTIFYING OFFICER

30. PAYMENT ☐ COMPLETE ☐ PARTIAL ☐ FINAL

31. PAID BY

32. AMOUNT VERIFIED CORRECT FOR

33. CHECK NUMBER

34. BILL OF LADING NUMBER

RECEIVED AT — 37. RECEIVED BY — 38. DATE RECEIVED — 39. TOTAL CONTAINERS — 40. S/R ACCOUNT NUMBER — 41. S/R VOUCHER NUMBER

AFSC Form 700, DEC 88 — PREVIOUS EDITION IS OBSOLETE

*When used as a formal contract this will be the effective date.

REFERENCE AF FORM 616 H93SR232 (Change #1), DATED: 23 MAR 93

1. In accordance with the provisions of the Basic Contract F33615-90-D-4010 and this Delivery Order 0022, the contractor shall accomplish the effort described in the Statement of Work (SOW) dated 16 MAR 93 attached hereto at a total ceiling price of $299,855.00.

2. As a result of paragraph 1 above, the subject order is more specifically modified as set forth below:

SECTION B - THE SCHEDULE:

Item No	Supplies/Services	Quantity Purch Unit	Unit Price Total Item Amt
0001	CLIN sec class: U	1 LO	N N

noun: SAMPLING, ANALYSIS AND DATA
acrn: AA nsn: N
site codes pqa: D acp: D fob: D
pr/mipr data: FY7624-93-08202
type contract: Y

descriptive data:
Conduct work in accordance with the Statement of Work (SOW) of this order, dated 16 MAR 93 and Section C, The Description/Specifications of the Basic contract. Submit data in accordance with Attachment #1, the Contract Data Requirements List (CDRL) of the basic contract as implemented by paragraph VI of this order's SOW dated 16 MAR 93.

Item No	Supplies/Services	Quantity Purch Unit	Unit Price Total Item Amt
0002	CLIN sec class: U	1 LO	N N

noun: SUPPORT
acrn: AA nsn: N
site codes pqa: D acp: D fob: D
pr/mipr data: FY7624-93-08202
type contract: Y

descriptive data:
Provide support in accordance with the Statement of Work (SOW) of this order, dated 16 MAR 93 and Section C, The Description/Specification of the basic contract.

3. SECTION C - Description/Specification: - See attached Statement of Work entitled "Installation Restoration Program/Remedial Investigation/Feasibility Study for Distant Early Warning (DEW) line Sites, AK (Barter Island AFS (BAR-M), Bullen Point AFS (POW-3), Point Lonely AFS (POW-1), Point Barrow AFS (POW-M), Point Lay AFS (LIZ-2), Wainwright AFS (LIZ-3), and Oliktok Point AFS (POW-2)" dated 16 MAR 93.

4. SECTION F - Schedule Data:

Item No	Supplies Schedule Data	Delivery Quantity	Schedule Date
0001	CLIN Del Sch sec class: U acrn: AA ship to: U descriptive data: Technical effort shall be completed in accordance with the Statement of Work (SOW) dated 16 MAR 93. All data shall be delivered in accordance with Attachment #1 of the basic contract as implemented by paragraph VI of the Statement of Work dated 16 MAR 93. The data shall be accepted by the Government not later than 31 DEC 93.	1	93DEC31
0002	CLIN Del Sch sec class: U acrn: AA ship to: U descriptive data: Technical effort shall be completed in accordance with the Contract Data Requirements List (Attachment #1) of the basic contract as implemented by paragraph VI of the Statement of Work.	1	93DEC31

1993 March 16

STATEMENT OF WORK
INSTALLATION RESTORATION PROGRAM
REMEDIAL INVESTIGATION/FEASIBILITY STUDY

STAGE 1

DISTANT EARLY WARNING (DEW) LINE SITES and CAPE LISBURNE AFS, AK

I. DESCRIPTION OF WORK

1.1 Scope

1.1.1 **Background.** The objective of the Air Force Installation Restoration Program (IRP) is to assess past hazardous waste disposal and spill sites on Air Force installations and develop remedial actions consistent with the National Contingency Plan (NCP) for those sites which pose a threat to human health and welfare or the environment. This objective is achieved through a Remedial Investigation Feasibility Study (RI/FS) process in which conclusions and recommendations drawn from accurate and validated data are used to structure and guide subsequent activities.

The RI/FS process includes scoping to define data requirements and objectives, a remedial investigation to characterize sites for a baseline risk assessment, and a feasibility study to define and evaluate alternative remedial actions so that a recommended action may be selected. Each of these steps of the RI/FS process can be conducted in stages that focus on particular aspects of the process.

The contractor shall accomplish the actions described in this Statement of Work (SOW) to complete the RI/FS process at the following seven Dew Line Sites and Cape Lisburne:

Barter Island AFS (BAR-M); Bullen Point AFS (POW-3); Point Lonely AFS (POW-1); Point Barrow AFS (POW-M); Point Lay AFS (LIZ-2); Wainwright AFS (LIZ-3); and Oliktok Point AFS (POW-2).

1.1.2 **Requirements for Project Activities.** The Installation Restoration Program (IRP) Handbook referenced in this Statement of Work provides requirements for laboratory and field activities and applicable formats for project documents that shall be used by the contractor. Volume 1 of the Handbook dated May 1992 is provided under separate cover. This document is referenced in this Statement of Work as the Handbook. The contractor is responsible for the thorough knowledge and understanding of the previous findings and recommendations that affect this task prior to the start of field activities. The documents involved include but are not limited to the IRP Phase I Records Search, and the IRP Phase II plans and reports addressing the Dew Line Sites and Cape Lisburne.

1.1.3 **Meetings.** A maximum of two (2) contractor personnel, including the project leader, shall attend four (4) meetings at Elmendorf AFB, AK. Each meeting shall be two (2) 8-hour workdays in duration. All meetings shall be coordinated by the TPM .

1.1.4 **Special Notifications.** The contractor shall immediately report to the TPM, or designate, via telephone, any data or results generated during this investigation which may indicate an imminent health risk. Following this telephone notification, a written notice shall be prepared and

delivered within three (3) days. This notification shall include supporting documentation (sequence 16, para 6.1)

1.2 Project Scoping Documents

The purpose of the project scoping documents is to clearly and comprehensively define project activities prior to the initiation of field work. The contractor shall prepare and submit the following project scoping documents for this task prior to the initiation of any field activities or laboratory analyses.

1.2.1 **Engineering Network Analysis.** Provide within ten (10) days after the issuance of an order a computer generated network analysis which is a detailed task plan for the RI/FS work efforts. The network analysis (GANTT) chart shall be in the form of a progress chart of suitable scale to indicate appropriately the percentage of work scheduled for completion by any given date during the period of the delivery order. The network analysis (GANTT) shall show both serial and parallel subtasks leading to a deliverable product or report, and shall show early and late start and completion dates with float. The network analysis (GANTT) shall be updated and submitted quarterly (sequence 3, para 6.1).

1.2.2 **Work Plan.** This section will discuss the overall approach, (including a brief summary of the Conceptual Site Model and Data Quality Objectives), major tasks, scope, timeline, and major decision points. Due to the extreme remoteness of the Dew Line Sites and Cape Lisburne, the contractor shall include a detailed plan for logistics and strategy to complete the RI/FS field activities. Follow the format specified in section 1 of the Handbook. In preparing the Work Plan, use previous reports and the information gathered during the literature search and presurvey along with experience at similar sites. Reevaluate the recommendations for Dew Line Sites and Cape Lisburne developed during previous IRP stages (sequence 4, para 6.1).

1.2.3 **Sampling and Analysis Plan (SAP).** The SAP consists of a quality assurance plan (QAPP) and a Field Sampling Plan (FSP). Prepare a SAP describing how project activities will be accomplished in the format specified in section 1 of the Handbook. Incorporate review comments and obtain TPM concurrence prior to the start of field activities (sequence 4, para 6.1).

1.2.4 **Health and Safety Plan (HSP).** Provide a written Health and Safety Plan within eight (8) weeks after the issuance of an order. The contractor shall comply with USAF, OSHA, EPA, state, and local health and safety regulations regarding the proposed work effort. Use EPA guidelines for designating the appropriate levels of protection needed at the study sites. The Health and Safety Plan shall provide no less protection than the protection contained in the manual entitled "Health and Safety Requirements for Employees Engaged in Field Activities" dated 1981 and the "Occupational Safety and Health Manual for Hazardous Waste Sites Activities" dated 1985 and 29 CFR 1910. Coordinate the Health and Safety Plan directly with applicable regulatory agencies prior to submittal to AFCEE/ESR. The contractor shall certify to AFCEE/ESR that the contractor has reviewed the coordinated Health and Safety Plan with each employee and also subcontractor's employees prior to the time each employee engages in field activities (sequence 4, para 6.1).

1.2.5 **Community Relations Plan.** The contractor shall prepare a Community Relations Plan (CRP) for the DEW Line Sites and Cape Lisburne AFS outlining the specific public communications and involvement techniques to be used in coordination with remedial site activities (sequence 4, para 6.1). Follow the guidance contained in "Community Relations in Superfund, a Handbook", office of Solid Waste and Emergency Response (OSWER) Directive

9230.0-03C (EPA/540/R-92/009, January 1992, PB92-963341), and other applicable directives. Also, use as a guidance previously accomplished CRP from other installations in Alaska. Appropriately adapt such guidance to the local situation at the DEW Line Sites and Cape Lisburne. As described in OSWER Directive 9230.0-03C, the CRP shall include, but not be limited to, a description of the sites and the community, an overview of the community involvement to date, key community concerns regarding the site and AF site activities, and suggested community relations activities. A contact list of elected officials, agency representatives, and interested groups and individuals shall be included in appropriate copies of the plan. In addition, the plan will include suggested locations for meetings and information repositories. Contractor activities to develop the CRP shall include conducting a review of site information provided by the AF.

1.3 Project Activities

The contractor shall conduct the following tasks to achieve the purposes stated herein, in compliance with approved scoping documents, the Handbook, and all applicable regulations and requirements.

1.3.1 Community Relations. Provide support to the base public affairs office for the tasks described below pertaining to the RI/FS Community Relations Program.

1.3.1.1 Public meetings and workshops. The contractor shall be responsible for coordinating public meetings and workshops for all DEW Line Sites and Cape Lisburne AFS. This includes producing briefing scripts, slides and any associated products such as response cards and sign-in sheets. As requested by the base Community Relations office in coordination with the TPM, research and provide materials for public queries, news media queries, and news releases. Assume a maximum of one (1) workshop/meeting (Seq. nos. 3,9).

1.3.1.2 Public notices. As required by the base Community Relations office and the TPM, the contractor shall prepare and publish public notices for the Fairbanks and local newspapers. The purpose of these notices is to inform the public of a meeting, workshop, or comment period in which they have the opportunity to be involved in the IRP Program at DEW Line Sites and Cape Lisburne AFS. Also, these notices may be utilized to inform the public of other pertinent program information such as quarterly notices of documents placed in the information repositories. The format for the notices shall be coordinated with the Community Relations office and TPM, and then submitted to the TPM for review prior to delivery to the base. Assume a maximum of two (2) notices (Seq. no. 3).

1.3.1.3 Photo Notebook The contractor shall develop a photo notebook which focuses on the overall IRP program at DEW Line Sites and Cape Lisburne AFS. The layout of the notebook will be coordinated with the public affairs office and TPM. Assume a maximum of one (1) update (Seq. no. 9).

1.3.1.4 Mailing List. In coordination with the base Community Relations office and the TPM, prepare and update the mailing list on a quarterly basis. Assume a maximum of two (2) updates (Seq. no. 3).

1.3.1.5 Maps. Prepare presentation quality maps of the installations and their sites to use in newsletters and to distribute to the public.

1.3.2 Literature Search. Conduct a literature search and analyze aerial photos of the DEW Line Sties to supplement existing information that has been collected. The purpose of the literature search is to complete the

conceptual site model so that a numerical estimate of risk can be developed.

1.3.3 **Presurvey.** Within eight weeks of the issuance of an order, the contractor shall visit the Dew Line Sites and Cape Lisburne to ensure complete understanding of site conditions. Coordinate this visit with the TPM and the 11 CEOS project manager. The contractor shall look for evidence of contamination at each site visited (e.g., leaking drums, vegetative stress, leachate seeps). The contractor shall observe the physical settings of each site visited to formulate specific recommendations concerning boring placement, use of geophysical techniques, and other aspects of the proposed field investigation. The findings of the presurvey shall be used to prepare the Work Plan, SAP, and HSP for the RI and to prepare scoping documents for the treatability study(ies). Assume one presurvey and one reconnaissance trips.

1.3.4 **Quality Assurance/Quality Control (QA/QC).** A QA/QC program shall be conducted and documented for all work pursuant to this delivery order. Contractor and project-specific documents concerning QA/QC procedures and requirements shall be strictly followed. Data generated under the QA/QC program shall be used by the contractor for evaluating the analytical results and field records assembled for each site to identify accurate and validated data that may be used to assess risk, develop conceptual site models and evaluate alternatives.

1.3.5 **Conceptual Site Model.** Use all available RI/FS data supported by acceptable QA/QC results (as measured against QAPP requirements) and site characterization information to refine, based on newly collected data, the conceptual site model. The model shall define the nature and extent of contamination and the transport and fate of those contaminants. The minimum requirements of the model are given in section 2 of the Handbook. The complexity and detail of the site model shall be consistent with the nature of the site and site problems, and the amount of data available. The conceptual site model shall be documented in the Work Plan.

1.3.6 **ARARs Evaluation.** The contractor shall identify all Applicable or Relevant and Appropriate Requirements (ARAR). These ARARs will be documented in the Work Plan.

1.4 Project Deliverables

Deliver the following documents in compliance with the requirements of item VI, the formats required in section 1 and 4 of the Handbook, and the specifications noted below. Draft reports are considered 'drafts' only because they have not been reviewed and approved by the Air Force. In all other respects, 'drafts' shall be complete, in the proper format, fully illustrated, and free of grammatical and typographical errors.

1.4.1 **Scoping Documents.**

a. Engineering Network Analysis (GANTT) (para 1.2.1). Provide within ten (10) days after the issuance of an order. Update and submit quarterly (sequence 3, para 6.1).

b. Work Plan (para 1.2.2). Use the format in section 1 of the Handbook (sequence 4, para 6.1).

c. Sampling and Analysis Plan (1.2.3). Use the format in section 1 of the Handbook (sequence 4, para 6.1).

d. Health and Safety Plan (para 1.2.4). Provide within six (6) weeks after the issuance of an order (sequence 4, para 6.1).

e. Community Relations Plan (para 1.2.5). Provide within eight (8) weeks after issuance of an order (sequence 4, para 6.1).

1.4.2 Special Notification. Provide written notification of imminent health hazards and supporting documentation within three (3) days of telephone notification (sequence 15, para 6.1).

1.4.3 Presentation Materials. The contractor shall prepare and present up to two (2) presentation packages at meetings coordinated by the Air Force (sequence 9, para 6.1). Attendance of these meetings is included in paragraph 1.1.3 of this SOW. As part of the presentation materials, the contractor shall provide paper copies of all slides and overheads.

1.4.4 Meeting summaries (para 1.1.3). Provide no later than five (5) days after conclusion of each meeting (sequence 18, para 6.1).

1.4.5 Newsletter. Prepare and submit a quarterly newsletter which presents the status of the entire base IRP Program. This will include preparing an outline resulting from input by all contractors involved in the program. The outline must be approved by the base and TPM prior to submittal of the newsletter. The final product will be printed and distributed as agreed to by the TPM. Assume a maximum of two (2) newsletters (Sequence no. 3).

1.4.6 Fact Sheets. As required by the base IRP Program, prepare and submit fact sheets which facilitate the public's understanding of the IRP Program. These sheets should include key community concerns regarding sites as specified by the base. Use the format agreed to by the base and TPM. Print and distribute the fact sheets as agreed to by the TPM. Assume a maximum of two (2) fact sheets (Sequence no. 3).

1.4.7 Public Notices. In accordance with paragraph 1.3.6.2, prepare and submit public notices for the Fairbanks and local newspapers. Use the format agreed to by the base and TPM (Sequence no. 3).

1.4.8 Photo Notebook. In accordance with paragraph 1.3.6.3, develop a photo notebbok which focuses on the overall base IRP Program. Prior to implementation, submit a conceptual layout of the notebook for review by the base and TPM (Sequence no. 9).

1.4.9 Mailing List. In accordance with the base Community Relations coordinator and paragraph 1.3.6.4, update the existing mailing list on a quarterly basis (Sequence no. 3).

1.4.10 Maps. In accordance with the base community Relations coordinator and paragraph 1.3.6.5, prepare presentation quality maps.

II. Site Location and Dates

Dew Line Sites and Cape Lisburne, date to be established.

III. Base Support The base will:

3.1 Provide the contractor with existing engineering plans, drawings, diagrams, aerial photographs, digitized map files, etc., to facilitate evaluation of IRP sites under investigation.

DEWSCOPG.DOC

3.2 Arrange for personnel identification badges, vehicles passes, and/or entry permits with the contention the contractor will provide necessary information to the base personnel no less than four weeks before needed.

3.3 Provide the contractor with all previously approved documents which provide information on all IRP efforts conducted at Dew Line Sites and Cape Lisburne and will aid in the determination of the amount of field work and analyses which need to be conducted.

IV. Government Furnished Property

See above in section III.

V. Government Points of Contact:

5.1 MAJCOM Coordinator

Major James R. Williams III
AFCEE/ESRU
8001 Inner Circle DR STE 2
Brooks AFB TX 78235-5328
(210) 536-5243
DSN 240-5243
(210) 536-9026 FAX
DSN 240-9026

5.2 Restoration Team Chief

Mr. Marty M. Faile
AFCEE/ESRU
8001 Inner Circle DR STE 2
Brooks AFB TX 78235-5328
(210) 536-5243
DSN 240-5243
(210) 536-9026 FAX
DSN 240-9026

5.3 Base Point of Contact (POC)

Mr. Jim Wolfe
11 CEOS/DEVR
21885 Second Street
Elmendorf AFB AK 99506-4420
(907) 552-4532
DSN 317-552-4532
(907) 552-1533 FAX
DSN 317-552-1533

5.4 Public Affairs Coordinator

Ms. Wende Wolf
11 CEOS/DEVR
21885 Second Street
Elmendorf AFB AK 99506-4420
(907) 552-4532
DSN 317-552-4532
(907) 552-1533 FAX
DSN 317-552-1533

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VI. Deliverables

6.1 Attachment 1 of the Basic Contract

Sequence numbers 1 and 5 listed in attachment 1 to the basic contract app. all orders. Guidance for preparing R&D Status Reports (sequence 1) is contained in the Handbook, section 4. In addition, the sequence numbers a[n] dates listed below are applicable to this order:

Sequence No.	PWS No.	Block 10 (Freq.)	Block 11 (as of date)	Block 12 (date of 1st submit.)	Block 13 (date of final report)	Block [14] (no. of copies)
3 (NETWORK ANALYSIS)	I.1.4.1a	QTRLY	12APR93	30APR93	a	6
4 (WORK PLAN)	I.1.4.1b	ONE/R	12APR93	30MAY93	30JULY93	b
4 (SAP)	I.1.1.4c	ONE/R	12APR93	30MAY93	30JULY93	b
4 (HSP)	I.1.4.1d	OTIME	12APR93	30MAY93	-	10
4 (COMM. REL. PLAN)	I.1.1.4e	ONE/R	12APR93	30MAY93	31DEC93	b
16 (SPECIAL NOTIF.)	I.1.4.2	OTIME	c	c	-	3
9 (REPRINT. MATERIAL)	I.1.4.3	ASREQ	d	d	-	10
10 (MTG. RPTS)	I.1.4.4	ONE/R	e	e	-	8
3 (NEWSLETTER)	I.1.4.5	QTRLY	12APR93	30NOV93	a	f
3 (FACT SHEETS)	I.1.4.6	ASREQ	12APR93	15JUL93	g	-
3 (PUBLIC NOTICES)	I.1.4.7	ASREQ	12APR93	15JUL93	g	[illegible]
9 (PHOTO NOTEBOOK)	I.1.4.8	OTIME	12APR93	15JUL93	-	[illegible]
3 (MAILING LIST)	I.1.4.9	QTRLY	12APR93	15JUL93	a	-
3 (MAPS)	I.1.4.10	OTIME	12APR93	15JUL93	-	2

6.2 Reserved.

6.3 Notes

a. Submit Quarterly Thereafter.

b. One (1) first draft plan (8 copies), one (1) second draft plan (8 copies), and one (1) final plan (10 copies) are required. Incorporate Air Force comments into the second draft and final plan as specified by the TPM. Supply AFCEE/ESR with an advance copy of the first draft, second draft, and final plan for acceptance prior to distribution. Distribute the remaining copies of each plan as specified by the TPM. The second and final reports shall be submitted within three (3) weeks of receipt of comments from the TPM.

c. Primary and Secondary Documents. One first draft report (25 copies), one second draft report (25 copies), and one final report (35 bound copies plus the original camera-ready copy and a 3.5 inch disk formatted in WordPerfect 5.1 containing the document file) are required. Incorporate Air Force comments into the second draft and final reports as specified by the TPM. Supply the TPM with an advance copy of the first draft, second draft, and final reports for acceptance prior to distribution. Distribute the remaining copies as specified by the TPM .

d. Provide written notice with supporting documentation within three (3) days of telephone notification and at the direction of the TPM. Assume a maximum of 100 pages.

e. Provide within one (1) week of task/meeting completion.

f. Provide 500 copies of the Newsletters and distribute as agreed to by the TPM. This includes mailing the final product to on-base personnel and addresses on the existing mailing list.

g. Provide draft and final deliverables. Provide two advance copies to the AFCEE TPM and to the 11 CEOS Community Relations Coordinator for acceptance prior to preparation of the final deliverables.

h. Provide poster-size map.

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AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. PAGE 1 OF 3

2. DOC INSTRUMENT ID NO. (PIIN): F33615-90-D-4010
3. SPIIN: 002201
4. EFFECTIVE DATE:
5. REQUISITION/PURCHASE REQUEST PROJECT NO.: FY7624-93-08305
6. BCC/DMS RATING: --

7. ISSUED BY — CODE FQ2826

DEPARTMENT OF THE AIR FORCE
AIR FORCE MATERIEL COMMAND
HUMAN SYSTEMS CENTER/PK
8005 9TH STREET
BROOKS AFB TX 78235-5353
Buyer: EDWIN CUSTODIO/HSC-PKVBA
Phone: (210) 536-4493

8. ADMINISTERED BY (IF OTHER THAN BLOCK 7) — CODE S2404A

DCMAO, BALTIMORE
200 TOWNSONTOWN BLVD., WEST
TOWNSON MD 21204-5299

9. CONTRACTOR NAME AND ADDRESS — CODE 69148 — FACILITY CODE

ICF TECHNOLOGY
9330 LEE HIGHWAY
FAIRFAX VA 22031-1207
COUNTY; FAIRFAX
PHONE: (703) 934-3000

MAIL DATE
JUN 1 ? 1993

IF "9" FOR MULTIPLE FACILITIES SEE SECT "K"

MAILING ADDRESS;
ICF TECHNOLOGY, INC
ATTN: CYNTHIA L. FALCE
FOUR GATEWAY CENTER 12TH FLOOR
PITTSBURGH PA 15222

10. SECURITY CLAS: U

11. DISCOUNT FOR PROMPT PAYMENT

1 ST	%	DAYS	NET DAYS
2 ND	%	DAYS	OTHER IF "9"
3 RD	%	DAYS	SEE SECT "E"

12. PURCHASE OFFICE POINT OF CONTACT: MVH/M6V/MVY

13. THIS BLOCK APPLIES ONLY TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in block 17. The hour and date specified for receipt of Offers ☐ is extended ☐ is not extended

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation, or as amended by one of the following methods:

(a) By signing and returning ______ copies of this amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE ISSUING OFFICE PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

14. THIS BLOCK APPLIES ONLY TO MODIFICATION OF CONTRACTS

☐ THIS CHANGE IS ISSUED PURSUANT TO ______ THE CHANGES SET FORTH HEREIN ARE MADE TO THE ABOVED NUMBERED CONTRACT/ORDER.

☐ THE ABOVE NUMBERED CONTRACT IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (SUCH AS CHANGES IN PAYING OFFICE, APPROPRIATION DATA, ETC.) SET FORTH HEREIN.

☐ THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF ______ IT MODIFIES THE ABOVE NUMBERED CONTRACT AS SET FORTH HEREIN.

☒ THIS MODIFICATION IS ISSUED PURSUANT TO FAR 52.243-3, Changes - Time and Materials or Labor Hours (Aug 1987)

15. CONTRACT ADMINISTRATION DATA

A. KIND OF MOD	B. MOD ABST RECIPIENT ADP PT	C. DATE OF SIGNATURE MODIFICATION	D. CHANGE IN CONTRACT AMOUNT INCREASE (+) DECREASE (-)	E. LOSING PO/CAO ON TRANSFER	F. GAINING PO/CAO ON TRANSFER	G. SVC/AGENCY USE
C			$			

16. ENTER ANY APPLICABLE CHANGES

A. PAY CODE	B. EFFECTIVE DATE OF AWARD	C. CONTRACT (1) TYPE (2) KIND	D. TYPE CONTR	E. SURV CRIT	F. SPL CONTR PROVISIONS	G. PAYING OFC CODE	H. DATE SIGNED	I. SECURITY (1) CLAS (2) DATE OF DD 254
							-	

17. REMARKS *(Except as provided herein, all items and conditions of the contract, as heretofore changed, remain unchanged and in full force and effect.)* SUBJ: INCREASE IN CEILING AMOUNT

PROJECT OFFICER: MICHAEL F. MCGHEE, AFCEE/ESR, 8001 INNER CIRCLE, SUITE 2, BROOKS AFB, TX 78235-5328
FINANCE OFFICE:(SC1010) DFAS-COLUMBUS CENTER
ATTN: INDEPENDANCE
P.O. BOX 182362, COLUMBUS OHIO 43218-2362

18. ☒ CONTRACTOR/OFFEROR IS NOT REQUIRED TO SIGN THIS DOCUMENT ☐ CONTRACTOR/OFFEROR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN ______ COPIES TO ISSUING OFFICE

19. CONTRACTOR/OFFEROR *(Signature of person authorized to sign)*
BY

20. NAME AND TITLE OF SIGNER *(Type or print)*

21. DATE SIGNED

22. UNITED STATES OF AMERICA *(Signature of Contracting Officer)*
BY Gary J. Macdecy

23. NAME OF CONTRACTING OFFICER *(Type or print)*: GARY J. MACDECY

24. DATE SIGNED: 93 Jun 16

AFMC FORM 702, JUL 92 — REPLACES AFSC FORM 702, AUG 84 WHICH IS OBSOLETE

1. Pursuant to the "Changes" Clause of Section I of the basic contract. The ceiling amount for the order is increased by $99,986. from $299, 855. to $399,841. The performance period remains the same, 31 DEC 93,as a result of this change.

2. As a result of paragraph 1 above, said order is more specifically modified as follows:

a. SECTION A - Cover page - The NTE amount in Block 20 (Cover Page) is increased by $99,986. from $299,855. to $399,841.

b. SECTION B - Supplies and Services - Establish Special ACRN XA.

Item No	Supplies/Services		Quantity Purch Unit	Unit Price Total Item Amt
0001	CLIN Change	sec class: U		N N
	noun: SAMPLING, ANALYSIS, AND DATA acrn: XA nsn: N site codes pqa: D acp: D fob: D type contract: Y			
0002	CLIN Change	sec class: U		N N
	noun: SUPPORT acrn: XA nsn: N site codes pqa: D acp: D fob: D type contract: Y			

c. SECTION C - Description/Specs/Work Statement - The SOW for this order remains the same as the Basic order entitled, "Installation Restoration Program/Remedial Investigation/Feasibility Study for Distant Early Warning (DEW) Line Sites and Cape Lisburne AFS, AK" dated 16 MAR 93.

d. SECTION F - Supplies Schedule Data - is modified to include ACRN AB and Special ACRN XA.

Item No	Supplies Schedule Data		Delivery Quantity	Schedule Date
0001	CLIN Del Sch Change acrn: XA ship to: U	sec class: U	1	93DEC31

0002 CLIN Del Sch Change sec class: U
acrn: XA
ship to: U 1 93DEC31

e. SECTION G. - Accounting Classification Data - is amended as set forth below:

ACRN	Acct Class Data	Appropriation/Lmt Subhead/CPN Recip DODAAD Supplemental Accounting Classification	Obligation Amount
AB	ACCOUNT ESTABLISH UNCLASSIFIED 5733400	F74400 303 7434 434419 000007 53440 000000 674400	$99,986.00
	pr/mipr data: FY7624-93-08305		
XA	SPECIAL ACRN ESTABLISH UNCLASSIFIED		

descriptive data:
Special ACRN XA funds CLINs 0001 and 0002 and includes the following:

ACRN AA: $299,855.
AB: $ 99,986.
TOTAL $399,841.

Finance Officer: Pay Funds in Alphabetical Order.

3. This supplemental agreement constitutes full settlement of any claims of the contractor under the contract, including the clause entitled, "Changes", arising out of or in connection with the changes effected hereby.

REF 68X 68X

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

2. PROC INSTRUMENT ID NO. (PIIN)	3. SPIIN	4. EFFECTIVE DATE	5. REQUISITION/PURCHASE REQUEST PROJECT NO.	6. BCC/DMS RATING
F33615-90-D-4010	002202	93JUL23	FY7624-93-08353	--

7. ISSUED BY CODE FQ2826

DEPARTMENT OF THE AIR FORCE
AIR FORCE MATERIEL COMMAND
HUMAN SYSTEMS CENTER/PK
8005 9TH STREET
BROOKS AFB TX 78235-5353
Buyer: REBECCA ROUNSAVILL/PKVBA
Phone: (210) 536-4502

8. ADMINISTERED BY (IF OTHER THAN BLOCK 7) CODE S2404A

DCMAO, BALTIMORE
ATTN: CHESAPEAKE
200 TOWNSONTOWN BLVD, WEST
TOWNSON MD 21204-5299

9. CONTRACTOR CODE 69148 FACILITY CODE
NAME AND ADDRESS
ICF TECHNOLOGY
9330 LEE HIGHWAY
FAIRFAX VA 22031-1207
COUNTY; FAIRFAX
PHONE: (703) 934-3000

MAIL DATE
JUL 26 1993

IF "9" FOR MULTIPLE FACILITIES SEE SECT "K"

MAILING ADDRESS;
ICF TECHNOLOGY, INC
ATTN: CYNTHIA L. FALCE
FOUR GATEWAY CENTER 12TH FLOOR
PITTSBURGH PA 15222

10. SECURITY CLAS U

11. DISCOUNT FOR PROMPT PAYMENT

1 ST	%	DAYS	NET DAYS
2 ND	%	DAYS	OTHER IF "Y"
3 RD	%	DAYS	SEE SECT "E"

12. PURCHASE OFFICE POINT OF CONTACT
MVX/M6V/MVY

13. THIS BLOCK APPLIES ONLY TO AMENDMENTS OF SOLICITCITATIONS

☐ The above numbered solicitation is amended as set forth in block 17. The hour and date specified for receipt of Offers ☐ is extended ☐ is not extended

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation, or as amended by on of the following methods:

(a) By signing and returning ______ copies of this amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE ISSUING OFFICE PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter provided such telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

14. THIS BLOCK APPLIES ONLY TO MODIFICATION OF CONTRACTS

☐ THIS CHANGE IS ISSUED PURSUANT TO ______
THE CHANGES SET FORTH HEREIN ARE MADE TO THE ABOVED NUMBERED CONTRACT/ORDER.

☐ THE ABOVE NUMBERED CONTRACT IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (SUCH AS CHANGES IN PAYING OFFICE, APPROPRIATION DATA, ETC.) SET FORTH HEREIN.

☐ THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF ______
IT MODIFIES THE ABOVE NUMBERED CONTRACT AS SET FORTH HEREIN.

☒ THIS MODIFICATION IS ISSUED PURSUANT TO FAR 52.253-3, Changes - Time and Materials or Labor Hours. (AUG 1987)

15. CONTRACT ADMINISTRATION DATA

A. KIND OF MOD	B. MOD ABST RECIPIENT ADP PT	C. DATE OF SIGNATURE MODIFICATION	D. CHANGE IN CONTRACT AMOUNT INCREASE (+) DECREASE (-)	E. LOSING PO/CAO ON TRANSFER	F. GAINING PO/CAO ON TRANSFER	G. SVC/AGENCY USE
C			$			

16. ENTER ANY APPLICABLE CHANGES

A. PAY CODE	B. EFFECTIVE DATE OF AWARD	C. CONTRACT (1) TYPE (2) KIND	D. TYPE CONTR	E. SURV CRIT	F. SPL CONTR PROVISIONS	G. PAYING OFC CODE	H. DATE SIGNED	I. SECURITY (1) CLAS (2) DATE OF DD 254

17. REMARKS (Except as provided herein, all items and conditions of the contract, as heretofore changed, remain unchanged and in full force and effect.) SUBJ: INCREASE IN CEILING AMOUNT
PROJECT OFFICER: MICHAEL F. MCGHEE, AFCEE/ESR, 8001 INNER CIRCLE, SUITE 2, BROOKS AFB, TX 78235-5328
FINANCE OFFICE: (SC1030) DFAS-COLUMBUS CENTER
ATTN: DFAS-CO/CHESAPEAKE DIVISION
P.O. BOX 182264, COLUMBUS OHIO 43218-2264

18. ☒ CONTRACTOR/OFFEROR IS NOT REQUIRED TO SIGN THIS DOCUMENT ☐ CONTRACTOR/OFFEROR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN ______ COPIES TO ISSUING OFFICE

19. CONTRACTOR/OFFEROR (Signature of person authorized to sign)
BY

22. UNITED STATES OF AMERICA (Signature of Contracting Officer)
BY Gary J. Macdecy

20. NAME AND TITLE OF SIGNER (Type or print)

21. DATE SIGNED

23. NAME OF CONTRACTING OFFICER (Type or print)
GARY J. MACDECY

24. DATE SIGNED
93 Jul 23

AFMC FORM 702, JUL 92 REPLACES AFSC FORM 702, AUG 84 WHICH IS OBSOLETE

REFERENCE: AF Form 616 H93-SR329, DATED: 9 JUL 93; EXPIRES: 15SEP 93; $2.9M

1. Pursuant to the "Changes" Clause of Section I of the basic contract. The ceiling amount for the order is increased by $2,899,511.00 from $399,841.00 to $3,299,352.00. The performance period is changed to 94 Feb 15, as a result of this change.

2. As a result of paragraph 1 above, said order is more specifically modified as follows:

a. SECTION A Cover page - The NTE amount in Block 20 (Cover Page) is increased by $2,899,511.00 from $399,841.00 to $3,299,352.00.

b. SECTION B - Supplies and Services - Establish Special ACRN XA.

Item No	Supplies/Services	Quantity Purch Unit	Unit Price Total Item Amount
0001	CLIN Change sec class: U noun: SAMPLING, ANALYSIS AND DATA acrn: XA nsn: N site codes pqa: D acp: D fob: D type contract: Y		N N
0002	CLIN Change sec class: U noun: SUPPORT acrn: XA nsn: N site codes pqa: D acp: D fob: D type contract: Y		N N
0004	CLIN Establish sec class: U noun: CHEMICAL ANALYSES acrn: XA nsn: N site codes pqa: D acp: D fob: D pr/mirp Data: FY7624-93-08353 type contract: Y	1 LO	N N

c. SECTION C - Description/Specs/Work Statement - The SOW for this order entitled, "Installation Restoration Program Remedial Investigation/Feasibility Study, Stage 1, Distant Early Warning (DEW) Line Sites and Cape Lisburne AFS, AK", dated 6 JUL 93 is attached hereto as Attachment #1 to this modification.

d. SECTION F - Supplies Schedule Data is modified to include ACRN AB and Special ACRN XA.

Item No	Supplies Schedule Data		Delivery Quantity	Schedule Date
0001	CLIN Del Sch Change acrn: XA ship to: U	sec class: U	1	95JANØ1
0002	CLIN Del Sch Change acrn: XA ship to: U	sec class: U	1	95JANØ1
0004	CLIN Del Sch Establish acrn: XA ship to: U	sec class: U	1	95JANØ1

e. SECTION G - Accounting Classification Data - is amended as set forth below:

ACRN	Acct Class data	Appropriation/Lmt Subhead/CPN Recip DODAAD Supplemental Accounting Classification		Obligation Amount
AB	ACCOUNT CHANGE UNCLASSIFIED	5733400 303 7434 434419 000007 53440 000000 674400	F74400	$2,899,511.00+
	pr/mipr data:			
XA	SPECIAL ACRN CHANGE UNCLASSIFIED			

descriptive data:
Special ACRN XA funds CLINs 0001, 0002 and 0004 and includes the following:

ACRN AA:	$ 299,855.00	
AB:	$ 99,986.00	(MOD 0022-01)
	$2,899,511.00	(MOD 0022-02)
TOTAL	$3,299,352.00	

FINANCE OFFICER: Pay funds in alphabetical order.

3. This supplemental agreement constitutes full settlement of any claims of the contractor under the contract, including the clause entitled, "Changes", arising out of or in connecting with the changes effected hereto.

1993 JUL 6

STATEMENT OF WORK
INSTALLATION RESTORATION PROGRAM
REMEDIAL INVESTIGATION/FEASIBILITY STUDY

STAGE 1

DISTANT EARLY WARNING (DEW) LINE SITES and CAPE LISBURNE AFS, AK

I. DESCRIPTION OF WORK

1.1 Scope

1.1.1 **Background.** The objective of the Air Force Installation Restoration Program (IRP) is to assess past hazardous waste disposal and spill sites on Air Force installations and develop remedial actions consistent with the National Contingency Plan (NCP) for those sites which pose a threat to human health and welfare or the environment. This objective is achieved through a Remedial Investigation Feasibility Study (RI/FS) process in which conclusions and recommendations drawn from accurate and validated data are used to structure and guide subsequent activities.

The RI/FS process includes scoping to define data requirements and objectives, a remedial investigation to characterize sites for a baseline risk assessment, and a feasibility study to define and evaluate alternative remedial actions so that a recommended action may be selected. Each of these steps of the RI/FS process can be conducted in stages that focus on particular aspects of the process.

The contractor shall accomplish the actions described in this Statement of Work (SOW) to complete the RI/FS process at the following seven Dew Line Sites and Cape Lisburne:

Barter Island AFS (BAR-M); Bullen Point AFS (POW-3); Point Lonely AFS (POW-1); Point Barrow AFS (POW-M); Point Lay AFS (LIZ-2); Wainwright AFS (LIZ-3); and Oliktok Point AFS (POW-2).

1.1.2 **Requirements for Project Activities.** The Installation Restoration Program (IRP) Handbook referenced in this Statement of Work provides requirements for laboratory and field activities and applicable formats for project documents that shall be used by the contractor. Volume 1 of the Handbook dated May 1992 is provided under separate cover. This document is referenced in this Statement of Work as the Handbook. The contractor is responsible for the thorough knowledge and understanding of the previous findings and recommendations that affect this task prior to the start of field activities. The documents involved include but are not limited to the IRP Phase I Records Search, and the IRP Phase II plans and reports addressing the Dew Line Sites and Cape Lisburne.

1.1.3 **Meetings.** A maximum of two (2) contractor personnel, including the project leader, shall attend ~~four (4)~~ eight (8) meetings at Elmendorf AFB, AK. Each meeting shall be two (2) 8-hour workdays in duration. All meetings shall be coordinated by the Restoration Team Chief (RTC).

1.1.4 **Special Notifications.** The contractor shall immediately report to the RTC, or designate, via telephone, any data or results generated during this investigation which may indicate an imminent health risk. Following this telephone notification, a written notice shall be prepared and

delivered within three (3) days. This notification shall include supporting documentation (sequence 16, para 6.1)

1.2 Project Scoping Documents

The purpose of the project scoping documents is to clearly and comprehensively define project activities prior to the initiation of field work. The contractor shall prepare and submit the following project scoping documents for this task prior to the initiation of any field activities or laboratory analyses.

1.2.1 **Engineering Network Analysis.** Provide within ten (10) days after the issuance of an order a computer generated network analysis which is a detailed task plan for the RI/FS work efforts. The network analysis (GANTT) chart shall be in the form of a progress chart of suitable scale to indicate appropriately the percentage of work scheduled for completion by any given date during the period of the delivery order. The network analysis (GANTT) shall show both serial and parallel subtasks leading to a deliverable product or report, and shall show early and late start and completion dates with float. The network analysis (GANTT) shall be updated and submitted quarterly (sequence 3, para 6.1).

1.2.2 **Work Plan.** This section will discuss the overall approach, (including a brief summary of the Conceptual Site Model and Data Quality Objectives), major tasks, scope, timeline, and major decision points. Due to the extreme remoteness of the Dew Line Sites and Cape Lisburne, the contractor shall include a detailed plan for logistics and strategy to complete the RI/FS field activities. Follow the format specified in section 1 of the Handbook. In preparing the Work Plan, use previous reports and the information gathered during the literature search and presurvey along with experience at similar sites. Reevaluate the recommendations for Dew Line Sites and Cape Lisburne developed during previous IRP stages (sequence 4, para 6.1).

1.2.3 **Sampling and Analysis Plan (SAP).** The SAP consists of a quality assurance plan (QAPP) and a Field Sampling Plan (FSP). Prepare a SAP describing how project activities will be accomplished in the format specified in section 1 of the Handbook. Incorporate review comments and obtain RTC concurrence prior to the start of field activities (sequence 4, para 6.1).

1.2.4 **Health and Safety Plan (HSP).** Provide a written Health and Safety Plan within eight (8) weeks after the issuance of an order. The contractor shall comply with USAF, OSHA, EPA, state, and local health and safety regulations regarding the proposed work effort. Use EPA guidelines for designating the appropriate levels of protection needed at the study sites. The Health and Safety Plan shall provide no less protection than the protection contained in the manual entitled "Health and Safety Requirements for Employees Engaged in Field Activities" dated 1981 and the "Occupational Safety and Health Manual for Hazardous Waste Sites Activities" dated 1985 and 29 CFR 1910. Coordinate the Health and Safety Plan directly with applicable regulatory agencies prior to submittal to AFCEE/ESR. The contractor shall certify to AFCEE/ESR that the contractor has reviewed the coordinated Health and Safety Plan with each employee and also subcontractor's employees prior to the time each employee engages in field activities (sequence 4, para 6.1).

1.2.5 **Community Relations Plan.** The contractor shall prepare a Community Relations Plan (CRP) for the DEW Line Sites and Cape Lisburne AFS outlining the specific public communications and involvement techniques to be used in coordination with remedial site activities (sequence 4, para 6.1). Follow the guidance contained in "Community Relations in Superfund, a Handbook", office of Solid Waste and Emergency Response (OSWER) Directive

9230.0-03C (EPA/540/R-92/009, January 1992, PB92-963341), and other applicable directives. Also, use as a guidance previously accomplished CRP from other installations in Alaska. Appropriately adapt such guidance to the local situation at the DEW Line Sites and Cape Lisburne. As described in OSWER Directive 9230.0-03C, the CRP shall include, but not be limited to, a description of the sites and the community, an overview of the community involvement to date, key community concerns regarding the site and AF site activities, and suggested community relations activities. A contact list of elected officials, agency representatives, and interested groups and individuals shall be included in appropriate copies of the plan. In addition, the plan will include suggested locations for meetings and information repositories. Contractor activities to develop the CRP shall include conducting a review of site information provided by the AF.

1.3 Project Activities

The contractor shall conduct the following tasks to achieve the purposes stated herein, in compliance with approved scoping documents, the Handbook, and all applicable regulations and requirements.

1.3.1 **Community Relations.** Provide support to the base public affairs office for the tasks described below pertaining to the RI/FS Community Relations Program.

1.3.1.1 Public meetings and workshops. The contractor shall be responsible for coordinating public meetings and workshops for all DEW Line Sites and Cape Lisburne AFS. This includes producing briefing scripts, slides and any associated products such as response cards and sign-in sheets. As requested by the base Community Relations office in coordination with the RTC, research and provide materials for public queries, news media queries, and news releases. Assume a maximum of one (1) workshop/meeting (Seq. nos. 3,9).

1.3.1.2 Public notices. As required by the base Community Relations office and the RTC, the contractor shall prepare and publish public notices for the Fairbanks and local newspapers. The purpose of these notices is to inform the public of a meeting, workshop, or comment period in which they have the opportunity to be involved in the IRP Program at DEW Line Sites and Cape Lisburne AFS. Also, these notices may be utilized to inform the public of other pertinent program information such as quarterly notices of documents placed in the information repositories. The format for the notices shall be coordinated with the Community Relations office and RTC, and then submitted to the RTC for review prior to delivery to the base. Assume a maximum of two (2) notices (Seq. no. 3).

1.3.1.3 Photo Notebook. The contractor shall develop a photo notebook which focuses on the overall IRP program at DEW Line Sites and Cape Lisburne AFS. The layout of the notebook will be coordinated with the public affairs office and RTC. Assume a maximum of one (1) update (Seq. no. 9).

1.3.1.4 Mailing List. In coordination with the base Community Relations office and the RTC, prepare and update the mailing list on a quarterly basis. Assume a maximum of two (2) updates (Seq. no. 3).

1.3.1.5 Maps. Prepare presentation quality maps of the installations and their sites to use in newsletters and to distribute to the public.

1.3.1.6 <u>Information Repository/Administrative Record</u>. Prepare a listing of all documents required for the Information Repository and Administrative Record. Create an Informatin Repository and Administrative Record. The Reporsitory and Record will be maintained by the 11 CEOS/CEVR Community Relations Coordinator. Assume two locations for the Repository and Record, one in Anchorage and another in Elmendorf AFB, AK. Actual locations will be determined by the 11 CEOS/CEVR Community Relations Coordinator.

1.3.2 **Literature Search.** Conduct a literature search and analyze aerial photos of the DEW Line Sties to supplement existing information that has been collected. The purpose of the literature search is to complete the conceptual site model so that a numerical estimate of risk can be developed.

1.3.3 **Presurvey.** Within eight weeks of the issuance of an order, the contractor shall visit the Dew Line Sites and Cape Lisburne to ensure complete understanding of site conditions. Coordinate this visit with the RTC and the 11 CEOS project manager. The contractor shall look for evidence of contamination at each site visited (e.g., leaking drums, vegetative stress, leachate seeps). The contractor shall observe the physical settings of each site visited to formulate specific recommendations concerning boring placement, use of geophysical techniques, and other aspects of the proposed field investigation. The findings of the presurvey shall be used to prepare the Work Plan, SAP, and HSP for the RI and to prepare scoping documents for the treatability study(ies). Assume one presurvey and one reconnaisance trips.

1.3.4 **Quality Assurance/Quality Control (QA/QC).** A QA/QC program shall be conducted and documented for all work pursuant to this delivery order. Contractor and project-specific documents concerning QA/QC procedures and requirements shall be strictly followed. Data generated under the QA/QC program shall be used by the contractor for evaluating the analytical results and field records assembled for each site to identify accurate and validated data that may be used to assess risk, develop conceptual site models and evaluate alternatives.

1.3.5 **Conceptual Site Model.** Use all available RI/FS data supported by acceptable QA/QC results (as measured against QAPP requirements) and site characterization information to refine, based on newly collected data, the conceptual site model. The model shall define the nature and extent of contamination and the transport and fate of those contaminants. The minimum requirements of the model are given in section 2 of the Handbook. The complexity and detail of the site model shall be consistent with the nature of the site and site problems, and the amount of data available the conceptual site model shall be documented in the Work Plan.

1.3.6 **ARARs Evaluation.** The contractor shall identify all Applicable or Relevant and Appropriate Requirements (ARAR). These ARARs will be documented in the Work Plan.

1.3.7 **Data Collection, Sampling, and Analysis Procedures.** The contractor shall conduct field activities, sampling, laboratory analysis, and data quality assessment. Section 2 of the Handbook is recommended for the contractor to follow. The contractor shall conduct all activities in accordance with the WP and the SAP approved by the COR. The COR shall be notified in writing of any planned deviation from the activities specified in these documents. COR approval of deviations is required prior to performance.

The field investigation (including all drilling and sampling operations) shall be supervised by a registered geologist, hydrogeologist, or professional engineer. If required by the state, the on-site field supervisor shall be

certified by the state to install test wells. A detailed log of field conditions, materials penetrated during drilling, well completion, and sampling conditions, as described in Section 2 of the Handbook, shall be maintained and made available for Government inspection upon request. Decisions on well and boring locations, well depths, screened intervals, and all details of the field investigation shall be made by the COR, and the contractor's field or project supervisor.

1.3.8 **Regulatory Requirements and Permits.** All well drilling, development , sampling, laboratory analysis, and other activities pursuant to this effort shall be conducted in strict accordance with all applicable federal and state laws, ordinances, rules and regulations, and all authorities with jurisdiction over such activities. The contractor shall complete permits, applications, other documents, and proficiency tests required by the regulatory agencies. The contractor shall file documents with appropriate agencies and pay all applicable permit and filing fees. The contractor shall identify locations requiring permits to Radar Station Manager. The contractor shall include all correspondence in appendices to the technical reports in accordance with Section 4 of the Handbook.

All laboratory analyses shall conform to all applicable federal, state, and local regulatory agency requirements. If the requirements specify that certification is necessary to conduct one or more specific analyses, the contractor shall furnish documentation showing laboratory certification with the first set of analytical data supplied to AFCEE/ESR and the COR.

The contractor shall containerize and sample materials suspected to be hazardous in accordance with applicable requirements, Guidance from the Handbook, and the approved Plans. The contractor shall transport these containerized materials to a location within the installation boundary designated by the Radar Station Manager at a frequency specified by the Station Manager. The contractor shall handle, store, and/or dispose of potentially hazardous materials. The contractor shall transport and empty containerized materials determined not to be hazardous to locations within the installation boundary identified by the Station Manager.

1.3.9 **Remedial Investigation (RI).** The contractor shall conduct a RI to characterize environmental conditions; define the concentration, nature, and extent of contamination; and quantitatively estimate the risk to human health and the environment and study the area through the collection of geologic and hydrologic data, environmental samples, the laboratory analyses of those samples for potential contaminants, the evaluation of the analytical results and field measurements with respect to quality control data, and the interpretation and analysis of accurate and precise data. The purpose of data collection, sample collection, and laboratory analysis is to determine whether any contaminants generated from installation activities have entered the environment. The field investigation is used to determine the source of any identified contaminants, the magnitude of contamination relative to Applicable or Relevant and Appropriate Requirements (ARARs), and any naturally occurring or background concentrations for specific compounds. The RI shall comply with the specifications, procedures, and methodologies presented in the project-specific SAP. The COR must be notified in writing prior to any modification of or deviation from any activity described in these documents.

1.3.9.1 **Soil Borehole Drilling and Sampling and Well Installation and Sampling.** The contractor shall drill and collect samples from boreholes as specified in the SAP. The contractor shall evaluate the need to install, sample, and develop monitoring or extraction wells.

1.3.9.1.1 **Lithologic Samples.** The contractor shall describe core samples at least every five (5) feet of drilling or at each change in lithology, whichever is less, to indicate significant changes in lithology of characteristic properties that relate to the strata penetrated. Any deviations shall be coordinated with the COR. Guidance for standard identification practices are found in the Handbook. The contractor shall include in the field logbook observations made by the driller and rig geologist during drilling such as depth to water, penetration rate, drill rig behavior, and other observations that might be indicative of changes in formation characteristics. The contractor shall record depth to permafrost in all the soil borings and shall not proceed beyond five (5) feet into the permafrost layer.

1.3.9.1.2 **Drill Cuttings and Drilling Fluids.** The contractor shall containerize all drill cuttings and drilling fluids. All drill cuttings and drilling fluids shall be managed and disposed of in accordance with the project SAP. (Note: The contractor shall be responsible for providing all necessary containers.) The contractor shall be responsible for the logistics of the ultimate disposal of all drill fluids or drill cuttings deemed hazardous in accordance with current EPA off-site disposal policy and state and/or local hazardous waste disposal laws. The contrator shall coordinate with the Station Manager for on-site placement and disposal of all drill cuttings, fluids, purge fluid, and excavated material. If on-site disposal is excluded, all hazardous waste shall be transported by a permitted hazardous waste transporter to a licensed Resource Conservation and Recovery Act (RCRA) approved facility and be accompanied by a Uniform Hazardous Waste Manifest. The contractor shall provide a final, completed copy of the hazardous waste manifest to the 11 CEOS/CEVR. The Radar Stations' hazardous waste managers will sign all hazardous waste manifest documents.

1.3.9.1.3 **Well/Boring Precautions.** The contractor shall mark the field locations of all borings during the planning/mobilization phase of the field investigation. The contractor shall consult with base personnel to minimize the disruption of base activities, to properly position wells with respect to site locations, and to avoid penetrating underground utilities. The contractor shall obtain all permits prior to commencement of digging and drilling operations. The contractor shall utilize a registered land surveyor in determining the elevations and locations of all off-base background study borings. All borings and wells from which samples are taken shall be surveyed by the contractor for vertical and horizontal control. The contractor shall record the positions on project and site specific maps. Bench marks used must have been previously established from and be traceable to a U. S. Coast and Geodetic Survey (USCGS) or U. S. Geological Survey (USGS) survey marker. Clearly identify all bench mark locations on the base map.

1.3.9.1.4 **Water-Level Measurements in Boreholes.** The contractor shall measure water levels in all boreholes after the water level has stabilized. Include this information and the date of measurement in the boring logs. Also, record soil moisture conditions (moist, wet, saturated, etc.) in the boring log.

1.3.9.1.5 **Air Monitoring During Drilling.** The contractor shall monitor the ambient air in the breathing zone above the borehole during all drilling with an appropriate organic vapor analyzer to identify potentially hazardous and/or toxic vapors. Include air monitoring results in borehole logs.

1.3.9.1.6 **Subsurface Soil Sampling.** The contractor shall collect soil samples from borings as specified in the SAP. The SAP specifies the analytical methods, the parameters for analysis, and the estimated number of analyses for soil samples.

1.3.9.1.7 **Well Construction Requirements.** The contractor shall coordinate with the COR to determine well completion requirements (flush or projected above ground surface). All wells shall be secured as soon as possible after drilling. The contractor shall provide corrosion resistant locks for both flush and above-ground well assemblies. The locks shall be compatible with existing wells. The contractor shall turn the lock keys over to 11 CEOS/CEVR POC following completion of the field effort. The contractor shall coordinate with the 11 CEOS/CEVR POC, the RTC, and the COR the selection of exact well and screen placement, gravel pack design, and screen slot size.

1.3.9.1.8 **Well Logs.** For each well, the contractor shall prepare a well completion log and schematic diagram showing well construction details. Lithologic descriptions, well elevation survey data, and other information included in the well logs shall conform to the specifications of the SAP.

1.3.9.1.9 **Well Development.** The contrator shall develop each well as soon as possible. Guidance for well development procedures are found in the the Handbook. The contractor shall measure the rate of water production, pH, specific conductance, and water temperature during well development.

1.3.9.1.10 **Well Placement.** The contractor shall avoid installing wells in depressions or areas subject to frequent flooding and/or standing water. If wells must be installed in such areas, the contractor shall design the wells so standing water does not leak into the top of the casing or cascade down the annular space.

1.3.9.1.11 **Well and Borehole Clean-up.** The contractor shall clean the area following the completion of each well and borehole. The contractor shall return all sites to the original condition of the site.

1.3.9.1.12 **Groundwater and Surface Water Sampling.** The contractor shall collect groundwater and Surface Water samples from newly developed well and existing wells and from surface water bodies. The SAP shall specify the analytical methods, the parameters for analysis, and the estimated number of analyses for groundwater and surface water samples.

1.3.9.1.13 **Composite Sampling.** The contractor shall collect and analyze drill cuttings, fluids, purge fluids, and excavated material. The SAP shall specify the analytical methods, the parameters for analysis, and the estimated number of analyses for composite samples.

1.3.9.2 **Geophysical Surveys.** The contractor shall evaluate whether geophysical surveys are needed (e.g., to determine boundaries of landfills, to locate underground debris, utilities and storage tanks). Where geophysical surveys are appropriate, the contractor shall select a geophysical survey technique or techniques [such as ground penetrating radar (GPR), magnetometer or electromagnetic surveys (EM)] that will best meet the desired application. The technique(s) used shall be approved by the RTC prior to use. Approximate number of surveying days is included in Annex A which is to be used for costing purposes only. Appropriate grid systems shall be established and the contractor shall use the results of this survey to prepare a contour map of the results. Provide this map as an attachment to the first R&D Status Report

submitted after the completion of the geophysical surveys. The contractor shall perform the geophysical surveys before drilling and use the results in selecting the location of soil borings, wells, test pits, if necessary.

1.3.9.3 **Permeability Testing.** The contractor shall determine the need for a permeability test at Cape Lisburne AFS, to provide additional data on the hydrogeologic characteristics of the water table aquifer. The SAP shall specify the method to be used for the permeability test.

1.3.9.4 **Water Level Measurement.** The contractor shall evaluate the need for conducting a complete round of water level measurements in all existing and new wells at Cape Lisburne AFS at the beginning of field work and during the field sampling effort. Data gathered shall be used for interpreting groundwater flow directions and groundwater gradient.

1.3.9.5 **Soil Gas Surveys.** The contractor shall evaluate the need for soil gas surveys and Hydropunch (e.g., to select soil boring locations). If soil gas surveys and hydropunch are included as part of the approved Work Plan and FSP, the contractor shall establish appropriate grid systems. The contractor shall prepare a posting map of soil gas values relative to their location on the grid used. Provide this map as an attachment to the first R&D Status Report submitted after completion of the soil gas survey (sequence 3, para 6.1). Approximate number of surveying days are included in Annex A which is to be used for costing purposes only.

1.3.9.6 **Groundwater Field Screening.** The contractor shall perform groundwater field screening. The SAP shall specify the method, location, and type of groundwater field screening.

1.3.9.7 **Baseline Risk Assessment.** The contractor shall use data supported by acceptable QA/QC results (as measured against QAPP requirements) and the conceptual site model to numerically estimate the risk posed by site contaminants to human health and the environment. The contractor shall identify and list all ARARs for those contaminants detected in environmental samples at the site. The contractor shall provide all ARARs evaluations as an attachment to the Technical Report. Provide the results of the baseline risk assessment in the Technical Report using the formats in Section 4 of the Handbook as a guidance.

The contractor shall identify those sites posing minimal or no threat to human health, welfare, or the environment and for which no further action is appropriate.

The contractor shall use the results of the risk assessment in establishing remedial action objectives and developing remedial alternatives in the Feasibility Study.

1.3.9.8 **Defense Priority Model Scores.** The contractor shall use the Defense Priority Model to score the sites. The score shall be included as an appendix to the RI/FS Technical Report.

1.3.9.9 **Fate and Transport.** The contractor shall perform fate and transport modeling for contaminants of interest to include the projection of future contaminant concentrations within the boundaries of the site. This will be done in conjunction with the RI/FS report.

1.3.13 **Weekly Field Activity Report**

The contractor shall transmit a Weekly field activity report. The AFCEE RTC shall develop the format for the report.

1.4 Project Deliverables

Deliver the following documents in compliance with the requirements of item VI, the formats required in section 1 and 4 of the Handbook, and the specifications noted below. Draft reports are considered "drafts" only because they have not been reviewed and approved by the Air Force. In all other respects, "drafts" shall be complete, in the proper format, fully illustrated, and free of grammatical and typographical errors.

1.4.1 **Scoping Documents.**

a. Engineering Network Analysis (GANTT) (para 1.2.1). Provide within ten (10) days after the issuance of an order. Update and submit quarterly (sequence 3, para 6.1).

b. Work Plan (para 1.2.2). Use the format in section 1 of the Handbook (sequence 4, para 6.1).

c. Sampling and Analysis Plan (1.2.3). Use the format in section 1 of the Handbook (sequence 4, para 6.1).

d. Health and Safety Plan (para 1.2.4). Provide within six (6) weeks after the issuance of an order (sequence 4, para 6.1).

e. Community Relations Plan (para 1.2.5). Provide within eight (8) weeks after issuance of an order (sequence 4, para 6.1).

1.4.2 **Special Notification.** Provide written notification of imminent health hazards and supporting documentation within three (3) days of telephone notification (sequence 16, para 6.1).

1.4.3 **Presentation Materials.** The contractor shall prepare and present up to two (2) presentation packages at meetings coordinated by the Air Force (sequence 9, para 6.1). Attendance of these meetings is included in paragraph 1.1.3 of this SOW. As part of the presentation materials, the contractor shall provide paper copies of all slides and overheads.

1.4.4 **Meeting Summaries** (para 1.1.3). Provide no later than five (5) days after conclusion of each meeting (sequence 18, para 6.1).

1.4.5 **Newsletter.** Prepare and submit a quarterly newsletter which presents the status of the entire base IRP Program. This will include preparing an outline resulting from input by all contractors involved in the program. The outline must be approved by the base and RTC prior to submittal of the newsletter. The final product will be printed and distributed as agreed to by the RTC. Assume a maximum of two (2) newsletters (Sequence no. 3).

1.3.10 **Feasibility Study (FS).** The contractor shall perform a FS concurrently with the RI. As much of the FS as possible shall be performed early in the RI/FS process and refined as additional RI data are obtained. The contractor shall use the information from the RI and the baseline risk assessment to develop and evaluate remedial action alternatives for each site where a threat to human health or the environment exists. The contractor shall follow the procedures specified in USEPA OSWER Directive 9355.3-01, "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA." The contractor shall employ streamlining methods wherever possible and develop and evaluate the minimum number of alternatives needed to provide a range of promising treatment and containment actions. The contractor shall eliminate impracticable alternatives from further consideration early in the FS process. The scope and level of detail shall be consistent with the nature and complexity of site problems.

1.3.10.1 **Develop and Screen Alternatives.** The contractor shall establish remedial action objectives and remediation goals for protecting human health and the environment. These objectives and goals shall be determined based on identified ARARs and acceptable exposure levels as defined in the baseline risk assessment and refined throughout the RI/FS process. Identify general response actions and applicable technologies based on site and contaminant conditions, and combine technologies to formulate distinct alternatives. The contractor shall develop alternatives which eliminate, control, and /or reduce risk to human health or the environment to acceptable levels for each pathway. Where a wide variety of promising alternatives exists, the contractor shall screen the alternatives based on effectiveness, implementability, and cost. The contractor shall detail the development and screening of the alternatives process and identify the alternatives selected for detailed analysis in the Informal Technical Information Report (ITIR).

1.3.10.2 **Detailed Screening of Alternatives.** The contractor shall conduct a detailed analysis on each alternative selected and identified in the above step and approved by the COR. Using the methodology in OSWER Directive 9355.3-01, the contractor shall evaluate each alternative against the nine criteria. In addition to the individual assessment, the contractor shall perform a comparative analysis to determine the relative performance of alternatives. The contractor shall focus the analysis on sub-factors and criteria most pertinent to each site and the scope and complexity of the proposed action. Provide a summary of the Detailed Analysis of Alternatives in the R&D report submitted following task completion. Include summary tables of the individual and comparative analyses that will be used in the Technical Report.

1.3.11 **Desicion Documents.** The contractor shall prepare and submit Decision Documents (DD) following the Handbook Section 4.4 as guidance. The purpose of the DD is to support a remedial action alternative or a no further action alternative.

1.3.12 **Site Specific Requirements.** The contractor shall perform the requirements listed in this SOW in conformance with the guidance of the Handbook, requirements of the approved WP, and the SAP. Annex A specifies the proposed values for field and laboratory activities to be conducted, specifications for field activities, information for sediment and soil samples, analytical methods, parameters for analysis, estimated number of analyses for water/sediment/soil samples, required analytical methods, estimated number of analyses for all core samples, estimated number soil gas analyses for each parameter, and field QC sample requirements for soil and water samples for costing purposes only.

1.4.6 **Fact Sheets.** As required by the base IRP Program, prepare and submit fact sheets which facilitate the public's understanding of the IRP Program. These sheets should include key community concerns regarding sites as specified by the base. Use the format agreed to by the base and RTC. Print and distribute the fact sheets as agreed to by the RTC. Assume a maximum of two (2) fact sheets (Sequence no. 3).

1.4.7 **Public Notices.** In accordance with paragraph 1.3.6.2, prepare and submit public notices for the Fairbanks and local newspapers. Use the format agreed to by the base and RTC (Sequence no. 3).

1.4.8 **Photo Notebook.** In accordance with paragraph 1.3.6.3, develop a photo notebbok which focuses on the overall base IRP Program. Prior to implementation, submit a conceptual layout of the notebook for review by the base and RTC (Sequence no. 9).

1.4.9 **Mailing List.** In accordance with the base Community Relations coordinator and paragraph 1.3.6.4, update the existing mailing list on a quarterly basis (Sequence no. 3).

1.4.10 **Maps.** In accordance with the base community Relations coordinator and paragraph 1.3.6.5, prepare presentation quality maps.

1.4.11 **Information Repository/Administrative Records.** Submit the Information Repository and Administrative Records in accordance with Air Force Guidance and in concurrance with the COR and the base Community Relations Coordinator. (sequence no. 4, para 6.1)

1.4.12 **Data Management.** The contractor shall meet the data deliverable requirements of the Installation Restoration Program Information Management System (IRPIMS). The contractor shall be responsible for recording field and laboratory data into a computerized format as required by the most current version of the IRPIMS Data Loading Handbook (mailed under separate cover). In order to perform this task, the contractor shall use the IRPIMS Quality Control Tool (QC Tool) and PC software utility (mailed under separate cover with software manual) to quality check ASCII data files and to check all data files for compliance with requirements in the IRPIMS Data Loading Handbook. Upon request, the IRPIMS Contractor Data Loading Tool (CDLT) is available. This PC software is designed to assist the contractor in preparing the various ASCII data files.

Individual IRPIMS data files (e.g., analytical results, groundwater level data, etc.), including resubmissions, shall be delivered with a transmittal letter by the contractor to the Air Force Center for Environmental Excellence (AFCEE) in sequence according to a controlled time schedule as identified in the current version of the IRPIMS Data Loading Handbook. The contractor shall include a copy of the Quality Control Tool error report, i.e., output from the QC tool, for each IRPIMS file submission. The error report shall be submitted both in hard copy and as an electronic file on the submission disks with the filename of the error report identified in the transmittal letter (SEQUENCE No. 3).

All contractor data deliverables shall be sent to:

AFCEE/ESD BLDG 624W
ENVIRONMENTAL RESTORATION DIVISION
ATTN: IRPIMS Data Management
Brooks AFB, TX 78235-5000

In addition, the contractor shall provide a copy of the transmittal letter to the Air Force contracting office responsible for the contract, HSC/PKV (Brooks AFB, TX, 78235-5000) for AFCEE contracts. This letter shall identify the files included or otherwise omitted (with an appropriate explanation), the Government contract and delivery order number, and the Air Force POC that is responsible for monitoring the Government contract.

The contractor shall be responsible for the accuracy and completeness of all data submitted. All data entered into the IRPIMS data files and submitted by the contractor shall correspond exactly with the data contained in the original laboratory reports and other documents associated with sampling and laboratory contractual tasks.

Each file delivered by the contractor will be electronically evaluated by AFCEE/ESD for format compliance and data integrity in order to verify acceptance. All files delivered by the contractor are required to be error-free and in compliance with the IRPIMS Data Loading Handbook. Any errors identified by AFCEE/ESD in the submission shall be corrected by the contractor.

1.4.13 **Decision Document.** The contractor shall prepare and submit DD as described in Section 1.3.11 (SEQUENCE No. 4, para 6.1).

1.4.14 **Technical Reports.** Summarize the findings of the tasks pursuant to the SOW, integrate them with the results of all pertinent previous studies, and formulate conclusions and recommendations for future efforts in Technical Reports.

1.4.14.1. **Remedial Investigation (RI) Report** (para 1.3.3). Provide a RI Report following the format in section 4 of the Handbook (sequence 4, para 6.1).

1.4.14.2. **Risk Assessment (RA) Report** (para 1.3.3.7). Provide a RA Report following the format in section 4 of the Handbook (sequence 4, para 6.1).

1.4.14.3 **Feasibility Study Report** (para 1.3.4). Provide a Feadsibility Study Report foillowing the format in section 4.0 of the Handbook. (sequence 4, para 6.1).

1.4.14.4 **RI/FS Technical Report** (para 1.3.3). Provide a RI/FS Technical Report following the format in section 4.0 of the Handbook. The RI/FS Technical Report shall integrate the RI, RA, and FS reports. Provide two microfiche copies with the final RI/FS Technical Report (sequence 4, para 6.1).

1.4.15 **Basewide Comprehensive IRP Document.** The contractor shall develop a comprehensive document that summarizes both the historic and projected IRP activities. This document shall be used as managment tool to efficiently guide future IRP activities at the DEW Line Sites and Cape Lisburne AFS. The contractor shall follow the outline developed by the AFCEE RTC. Assume two (2) updates (sequence no. 4)

1.4.16 **Analytical Data ITIR.** Prepare and submit the following ITIR's:

a. Development & Screening of Alternatives (para. 1.3.10.1). Submit the results of the development and screening of alternatives in an ITIR prepared in compliance with section 3 of the Handbook (sequence 3, para 6.1)

b. Detailed Screening of Alternatives (para 1.3.10.2).

c. DPM Scoring (para 1.3.9.8). Provide scores, a summary of procedures and assumptions, and Automated DPM output tables for all sites scored with DPM (sequence 3, para 6.1).

d. Mylar[R] Map. Construct Radar Stations' maps of Mylar using guidelines in section 3 of the Handbook. The Maps shall contain all sites and related water and sediment sampling locations (sequence no.3, para. 6.1). The contractor shall create and update digitized map files. Use the digitized data file to produce the Mylar map. The contractor shall print the revision date on the Mylar maps and the date shall be encoded in the digitized data file. Provide a copy of the revised digitized data file to AFCEE-ESO/ER (sequence 1, para. 6.2).

e. Geophysical Survey Contour Map (para 1.3.9.2). Provide a contour map showing geophysical survey results. Interpret the significance of the data in the R&D Status Report (sequence 3, para 6.1).

f. Soil Gas Map (para 1.3.9.5). Provide site maps showing soil gas data superimposed on the sampling locations and incorporate soil gas data generated by the 11 CEOS/CEOR. Interpret the significance of the data in the R&D Status Report (sequence 3, para 6.1).

g. Site Characterization Summary Informal Technical Information Report (SCS ITIR). The contractor shall prepare the report to include the following components:

1. Source identification and contaminant delineation.

2. Identification and ranking of appropriate treatability studies for the listed sites.

3. Data and interpretations integrating the findings of the current study and all previous RI efforts at the sites.

4. Current isoconcentration plots of contaminants detected at each site, lithologic logs of each boring showing contaminants detected and relationship to other borings in the site, and cross-sections of the site showing contaminant distribution.

5. The contents and objectives of a Site Characterization Summary Informal Technical Information Report (ITIR) are specified in the Handbook. The Site Characterization Summary ITIR shall serve as a core document for the RI report. The contractor shall submit an annotated outline of each section of the ITIR for approval by the TPM prior to preparation of the report itself. The contractor shall prepare the report as specified in the accepted annotated outline. The contractor shall submit newly revised portions of the working draft ITIR in order to make available current site characterization data. A prime objective shall be to minimize the volume of comments on the working draft and final submittals by incorporating comments into the report in an on-going manner. The final summary shall contain all sites included in this effort (Sequence No. 4).

h. Weekly Field Activities Report (para 1.3.13). Transmit a Weekly field activities report during field activities pursuant to a format developed by the AFCEE RTC. (Seqence 4, para 6.1)

II. Site Location and Dates

Dew Line Sites and Cape Lisburne, date to be established.

III. Base Support The base will:

3.1 Provide the contractor with existing engineering plans, drawings, diagrams, aerial photographs, digitized map files, etc., to facilitate evaluation of IRP sites under investigation.

3.2 Arrange for personnel identification badges, vehicles passes, and/or entry permits with the contention the contractor will provide necessary information to the base personnel no less than four weeks before needed.

3.3 Provide the contractor with all previously approved documents which provide information on all IRP efforts conducted at Dew Line Sites and Cape Lisburne and will aid in the determination of the amount of field work and analyses which need to be conducted.

IV. Government Furnished Property

See above in section III.

V. Government Points of Contact:

5.1 MAJCOM Coordinator

Major James R. Williams III
AFCEE/ESRU
8001 Inner Circle DR STE 2
Brooks AFB TX 78235-5328
(210) 536-5243
DSN 240-5243
(210) 536-9026 FAX
DSN 240-9026

5.2 Restoration Team Chief

Mr. Michael F. McGhee
AFCEE/ESRU
8001 Inner Circle DR STE 2
Brooks AFB TX 78235-5328
(210) 536-5293
DSN 240-5293
(210) 536-9026 FAX
DSN 240-9026

5.3 Base Point of Contact (POC)

Mr. Jim Wolfe
11 CEOS/CEVR
21885 Second Street
Elmendorf AFB AK 99506-4420
(907) 552-4532
DSN 317-552-4532
(907) 552-1533 FAX
DSN 317-552-1533

5.4 Public Affairs Coordinator

Ms. Wende Wolf
11 CEOS/DEVR
21885 Second Street
Elmendorf AFB AK 99506-4420
(907) 552-4532
DSN 317-552-4532
(907) 552-1533 FAX
DSN 317-552-1533

VI. Deliverables

6.1 Attachment 1 of the Basic Contract

Sequence numbers 1 and 5 listed in attachment 1 to the basic contract apply to all orders. Guidance for preparing R&D Status Reports (sequence 1) is contained in the Handbook, section 4. In addition, the sequence numbers and dates listed below are applicable to this order:

Sequence No.	Para No.	Block 10 (freq.)	Block 11 (as of date)	Block 12 (date of 1st. submit.)	Block 13 (date of final report)	Block 14 (no. of copies)
3 (NETWORK ANALYSIS)	1.1.4.1a	QTRLY	12APR93	30APR93	a	4
4 (WORK PLAN)	1.1.4.1b	ONE/R	12APR93	30MAY93	30JULY93	b
4 (SAP)	1.1.1.4c	ONE/R	12APR93	30MAY93	30JULY93	b
4 (HSP)	1.1.4.1d	OTIME	12APR93	30MAY93	-	10
4 (COMM. REL. PLAN)	1.1.1.4e	ONE/R	12APR93	30MAY93	31DEC93	b
16 (SPECIAL NOTIF.)	1.1.4.2	OTIME	c	c	-	3
9 (PRESNT. MATERIAL)	1.1.4.3	ASREQ	d	d	-	10
18 (MTG. RPTS)	1.1.4.4	ONE/R	e	e	-	5
3 (NEWSLETTER)	1.1.4.5	QTRLY	12APR93	30NOV93	a	f
3 (FACT SHEETS)	1.1.4.6	ASREQ	12APR93	15JUL93	g	-
3 (PUBLIC NOTICES)	1.1.4.7	ASREQ	12APR93	15JUL93	g	h
9 (PHOTO NOTEBOOK)	1.1.4.8	OTIME	12APR93	15JUL93	-	1
3 (MAILING LIST)	1.1.4.9	QTRLY	12APR93	15JUL93	a	-
3 (MAPS)	1.1.4.10	OTIME	12APR93	15JUL93	-	2
4 INFO REPOS	1.1.4.11	OTIME	31JUL93	-	31JAN94	2
3 (IRPMS Data ITIR) (Data Management) BCHCON BCHLDI BCHSLI BCHWCI BCHSAMP BCHCALC BCHLTD BCHTEST BCHRES BCHGWD	1.1.4.12	OTIME	31JUL93	31JAN94	31MAR94	2
4 DECISION DOC	1.1.4.13	ONE/R	i	i	31OCT94	b
4 RI REPORT	1.1.4.14.1	ONE/R	15SEP93	15FEB94	30APR94	b
4 RISK ASSESSMENT	1.1.4.14.2	ONE/R	1OCT93	16MAY94	15JUL94	b
4 FEASIB. STUDY	1.1.4.14.3	ONE/R	30SEPT93	30AUG94	-	b
4 RI/FS Report	1.1.4.14.4	ONE/R	30SEP93	30SEP94	1JAN95	b
4 IRP DOCUMENT	1.14.15	ONE/R	31JUL93	31OCT93	10DEC93	b
3 SCREENING ALTER ITIR	1.1.4.16a	OTIME	30SEP93	30DEC93	-	10
3 DETAL ANALYSIS ALTER ITIR	1..1.4.16.b	OTIME	28 FEB94	30MAR94	-	10
1 DPM SCORING	1.1.4.16c	OTIME	30SEP93	j	j	3
3 MYLAR MAP	1.1.4.16d	OTIME	k	k	-	5
3 GEOPHYS CONT	1.1.4.16.e	OTIME	l	l	-	10
3 SOIL GAS MAP	1.1.4.16f	OTIME	l	l	-	10
4 SCS ITIR	1.1.4.16g	ONE/R	15SEP93	30NOV93	15FEB94	5
4 WEEKLY ACT REP	1.1.4.16h	WEEKLY	13AUG93	13AUG93	-	1

6.2 Reserved.

6.3 Notes

a. Submit Quarterly Thereafter.

b. One (1) first draft plan (8 copies), one (1) second draft plan (8 copies), and one (1) final plan (10 copies) are required. Incorporate Air Force comments into the second draft and final plan as specified by the RTC. Supply AFCEE/ESR with an advance copy of the first draft, second draft, and

final plan for acceptance prior to distribution. Distribute the remaining copies of each plan as specified by the RTC. The second and final reports shall be submitted within three (3) weeks of receipt of comments from the RTC.

c. Primary and Secondary Documents. One first draft report (25 copies), one second draft report (25 copies), and one final report (35 bound copies plus the original camera-ready copy and a 3.5 inch disk formatted in WordPerfect 5.1 containing the document file) are required. Incorporate Air Force comments into the second draft and final reports as specified by the RTC. Supply the RTC with an advance copy of the first draft, second draft, and final reports for acceptance prior to distribution. Distribute the remaining copies as specified by the RTC .

d. Provide written notice with supporting documentation within three (3) days of telephone notification and at the direction of the RTC. Assume a maximum of 100 pages.

e. Provide within one (1) week of task/meeting completion.

f. Provide 500 copies of the Newsletters and distribute as agreed to by the RTC. This includes mailing the final product to on-base personnel and addresses on the existing mailing list.

g. Provide draft and final deliverables. Provide two advance copies to the AFCEE RTC and to the 11 CEOS Community Relations Coordinator for acceptance prior to preparation of the final deliverables.

h. Provide poster-size map.

i. Submit with the second draft Technical Report

j. Submit with the Technical Report

k. Provide with the Technical Report

l. Provide within four (4) weeks of task completion

ANNEX-A, TABLE A-1
SUMMARY OF ESTIMATED FIELD WORK
FOR COST-ESTIMATING PURPOSES ONLY

Estimated Number of Monitor Wells to be Constructed	5
Estimated Footage of Monitor Wells	100
Estimated Number of Water Samples for Lab Analysis	339
Estimated Number of Surface and Subsurface Soil Sampling	1350
Estimated Number of Soil Samples from Augerings	1350
Estimated Number of Containerized Waste Samples	40
Estimated Number of Disposal Water Samples	5
Estimated Number of Sludge Samples	5
Estimated Number of Wipe Samples	3
Estimated Number of Geophysical Surveys	3
Estimated Total Number of Survey Days	20
Estimated Number of Soil Gas Survey Days	20

Annex-A, Table A-2
Analytical METHODS AND ESTIMATED TOTAL NUMBER OF SOIL ANALYSES
(for Cost Estimating Purposes Only)

	analytical method (a)	Reporting Units	Number of Analyses	Trip Blanks	Addl Cond Blanks	Equipment Blanks	Dup/Rep	Second Column(b)	Total Analyses
Petroleum Hydrocarbon (Gasoline Range Organics)	SW3050/SW8015 (mod)	mg/Kg	400	20	20	20	40	-	500
Petroleum Hydrocarbon (Diesel Range Organics)	SW3050/SW8015 (mod)	mg/Kg	400	-		20	40	-	460
ICP Screen (23 Metals, exclude Boron and Silica)	SW3050/SW6010	mg/Kg	100	-		6	10	-	116
Arsenic	SW3050/SW7060	mg/Kg	-	-		-	-	-	0
Lead	SW3050/SW7421	mg/Kg	-	-	-	-	-	-	0
Mercury	SW7471	mg/Kg	-	-		-	-	-	0
Selenium	SW3050/SW7740	mg/Kg	-	-		-	-	-	0
Organochlorine Pesticides and PCBs	SW3540/SW8080	mg/Kg	500	-		20	50	250	820
Volatile Organic Compounds	SW8240	mg/Kg	72	8	8	4	7	36	135
Semivolatile Organic Compounds	SW3540/SW8270	mg/Kg	100	-		10	10	-	120
Polynuclear Aromatic Hydrocarbons	SW3540/SW8310	mg/Kg	-	-		-	-	-	0
Volatile Organic Compounds	SW5030/SW8010	mg/kg	-	-		-	-	-	0
Volatile Organic Compounds	SW5030/SW8020	mg/kg	-	-		-	-	-	0
Volatile Organic Compounds	SW5030/SW8260	mg/kg	-	-		-	-	-	0
Total Organic Compounds	SW5030/SW9060	mg/kg	88	-	-	-	4	8	100
Cyanide, Total	SW9010	mg/Kg	-	-		-		-	0
Toxic Characteristic Leaching Procedures (TCLP)	SW1311	mg/L	40	-	-	-	-	-	40
Soil Moisture Content	ASTM D2216	Percent (%)	650	-		-	-	-	650
Soil PH	SW9045		650	-	-	-	-	-	650
Sulfer Cleanup/Florisil Cleanup	SW3660/SW3620		-	-	-	-	-	-	0
Gel-Permeation Cleanup	SW3640		-	-	-	-	-	-	0
Total Analyses			3000	28	28	80	161	294	3591

Annex A, TABLE A-3
Analytical Methods and Estimated Total Number of Water Analyses
(For Cost Estimating Purposes Only)

	analytical method (a)	Reporting Units	Number of Analyses	Trip Blanks	Amb. Cond Blanks	Equipment Blanks	Dup/Rep	Second Column(b)	Total Analyses
Alkalinity-Carbonate, Bicarbonate, & Hydroxide (field test)	A403	mg/L	10			-	1	-	11
Specific Conductance (field test)	E120.1	mg/L	10			-	1	-	11
pH (field test)	E150.1	µmhos/cm	15			-	2	-	17
Residue, Filterable (Total Dissoloved Solids)	E160.1	mg/L	80		-	3	8	-	91
Non-Filterable Residue (Total Suspended Solids)	E160.2	mg/L	80			-	8		88
Temperature (field test)	E170.1	deg C	200		-	-	-	-	200
Common Anions (Chloride, Fluoride, Sulfate)	E325.1	mg/L	-	-	-	-	-	-	0
Nitrogen, Nitrate+nitrite	E353.2	mg/L	-		-	-	-	-	0
ICP Screen (23 metals, exclude Boron and Silica)	SW3005/SW6010	mg/L	100		-	7	25	-	132
Arsenic	SW7060	mg/L	-		-	-	-	-	0
Lead	SW3005/SW7421	mg/L	100		-	2	10	-	112
Mercury	SW7470	mg/L	-		-	-	-	-	0
Selenium	SW7740	mg/L			-	-	-	-	0
Petroleum Hydrocarbons (Gasoline Range Organics)	SW5030/SW8015 (mod.)	mg/L	150	10	10	5	35	-	210
Petroleum Hydrocarbons (Diesel Range Organics)	SW5030/SW8015 (mod.)	mg/L	150			5	35	-	190
Purgeable Halocarbons	SW5030/SW8010	µg/L	150	8	8	4	25	75	270
Nonhalogenated Volatile Organics	SW5030/SW8015	µg/L	150	8	8	4	25	125	320
Purgeable Aromatics	SW5030/SW8020	µg/L	150	8	8	4	25	125	320
Organochlorine Pesticides and PCBs	SW3510/SW8080	µg/L	166	-	-	3	17	83	269
Semivolatile Organic Compounds	SW3510/SW8270	µg/L	150	-	-	4	15	-	169
Polynuclear Aromatic Hydrocarbons	SW3510/SW8310	µg/L	150		-	4	15	-	169
Volatile Organic Compounds	SW3510/SW8260	µg/L	-		-	-	-	-	0
Volatile Organic Compounds	SW3510/SW8240	µg/L	150	8	8	4	25	125	320
Total Organic Compounds	SW9060	µg/L	80			4	10		94
Total Petroleum Hydrocarbon (WTPH-HCID)	E418.1	mg/L	-	-	-	-	-	-	0
Sulfur Cleanup/Florisil Column Cleanup	SW3660/SW3620	-	-	-		-	-	-	0
Gel-Permeation Cleanup	SW3640	-	-			-	-	-	0
COLUMN TOTALS			2041	42	42	53	282	533	2993

Notes:

a Unless an abbreviated list of analytes is specified under "Parameter" above, the analytical protocol shall include all analytes listed in the referenced analytical method. The methods cited are from the following sources:

"A" Methods	Standard Methods for the Examination of Water and Wastewater, 16th Edition (1985)
"E" Methods	Methods for Chemical Analysis of Water and Wastes, EPA Manual, 600/4-79-020 (USEPA, 1983--with additions)
"SW" Methods	Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Edition (USEPA, 1986)
"ASTM" Methods	American Society for Testing and Materials, 1919 Race treet, Philadelphia, PA 19103

b The maximum number of second-column confirmation analyses shall not exceed fifty (50) percent of the actual number of field samples (to include duplicates, replicates, ambient, condition blanks, trip blanks, and equipment blanks). If the number of samples requiring second-column confirmation exceeds this allowance, contact the HSD Technical Project Manager. The total number of samples listed in Tables A-4 and A-5 includes the allowance applicable to each GC method. IF GC/MS, or a combination of second-column GC and GC/MS, is used, the total cost of all such analyses for a particular parameter shall not exceed the funding allowed for positive confirmation using only second-column GC.

REF 68X 68X

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. PAGE 1 OF 2

2. PROG INSTRUMENT ID NO. (PIIN)	3. SPIIN	4. EFFECTIVE DATE	5. REQUISITION/PURCHASE REQUEST PROJECT NO.	6. SCO/DMS RATING
F33615-90-D-4010	002203	94 FEB 15	FY7624-94-08235	

7. ISSUED BY CODE FA8900
DEPARTMENT OF THE AIR FORCE
AIR FORCE MATERIAL COMMAND
HUMAN SYSTEMS CENTER/PK
8005 9TH STREET
BROOKS AFB, TX 78235-5353
Buyer: EDWIN CUSTODIO/PKVBA
Phone: (210)536-4493

8. ADMINISTERED BY (IF OTHER THAN BLOCK 7) CODE S2404A
DCMAO, BALTIMORE
ATTN: CHESAPEAKE
200 TOWNSONTOWN BLVD, WEST
TOWNSON MD 21204-5299

9. CONTRACTOR NAME AND ADDRESS CODE 69148 FACILITY CODE
ICF TECHNOLOGY
9330 LEE HIGHWAY
FAIRFAX VA 22031-1207
COUNTY: FAIRFAX
PHONE: (703) 934-3000

IF "Y" FOR MULTIPLE FACILITIES SEE SECT "K"

MAILING ADDRESS:
ICF TECHNOLOGY, INC
ATTN: CYNTHIA L. FALCE
FOUR GATEWAY CENTER 12TH FL.
PITTSBURGH PA 15222

ADVANCE COPY

10. SECURITY CLAS U

11. DISCOUNT FOR PROMPT PAYMENT
1 ST % DAYS
2 ND % DAYS
3 RD % DAYS
NET DAYS
OTHER IF "0" SEE SECT "E"

12. PURCHASE OFFICE POINT OF CONTACT
MVH/M6V/MVH

13. THIS BLOCK APPLIES ONLY TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in block 17. The hour and date specified for receipt of Offers ☐ is extended ☐ is not extended

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods:

(a) By completing and returning ___ copies of this amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE ISSUING OFFICE PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

14. THIS BLOCK APPLIES ONLY TO MODIFICATION OF CONTRACTS

☐ THIS CHANGE IS ISSUED PURSUANT TO ______ THE CHANGES SET FORTH HEREIN ARE MADE TO THE ABOVE NUMBERED CONTRACT/ORDER.

☐ THE ABOVE NUMBERED CONTRACT IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (SUCH AS CHANGES IN PAYING OFFICE, APPROPRIATION DATA, ETC.) SET FORTH HEREIN.

☐ THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF ______ IT MODIFIES THE ABOVE NUMBERED CONTRACT AS SET FORTH HEREIN.

☒ THIS MODIFICATION IS ISSUED PURSUANT TO FAR52.253-3, CHANGES-TIME&MATLS OR LABOR HRS (AUG87)

15. CONTRACT ADMINISTRATION DATA

A. KIND OF MOD	B. MOD ABST RECIPIENT ADP PT	C. DATE OF SIGNATURE MODIFICATION	D. CHANGE IN CONTRACT AMOUNT INCREASE (+) DECREASE (-)	E. LOSING PO/CAO ON TRANSFER	F. GAINING PO/CAO ON TRANSFER	G. SVC/AGENCY USE
C			$			

16. ENTER ANY APPLICABLE CHANGES

A. PAY CODE	B. EFFECTIVE DATE OF AWARD	C. CONTRACT (1) TYPE (2) KIND	D. TYPE CONTR	E. SURV CRIT	F. SPL CONTR PROVISIONS	G. PAYING OFC CODE	H. DATE SIGNED	I. SECURITY (1) CLAS (2) DATE OF DD 254

17. REMARKS (Except as provided herein, all items and conditions of the contract, as heretofore changed, remain unchanged and in full force and effect.)
SUBJECT: TIME EXTENSION AT NO INCREASE IN CEILING AMOUNT
PROJECT OFFICER: MICHAEL F. MCGHEE, AFCEE/ESR, BROOKS AFB, TX 78235-5328
FINANCE OFFICE: (SC1030) DFAS-COLUMBUS CENTER
ATTN:DFAS-CO/CHESAPEAKE DIV.
P.O.BOX 182264, COLUMBUS OHIO 43218-2264

18. ☒ CONTRACTOR/OFFEROR IS NOT REQUIRED TO SIGN THIS DOCUMENT ☐ CONTRACTOR/OFFEROR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN ___ COPIES TO ISSUING OFFICE

19. CONTRACTOR/OFFEROR (Signature of person authorized to sign)
BY

22. UNITED STATES OF AMERICA (Signature of Contracting Officer)
BY Gary J. Macdecy

20. NAME AND TITLE OF SIGNER (Type or print)

21. DATE SIGNED

23. NAME OF CONTRACTING OFFICER (Type or print)
GARY J. MACDECY

24. DATE SIGNED
94 FEB 17

AFMC FORM 702, JUL 92 REPLACES AFSC FORM 702, AUG 84 WHICH IS OBSOLETE

1. Pursuant to the "Changes" Clause of Section I of the basic contract. The performance period and the final delivery schedule are changed from 15 Feb 94 (performance period) and 1 Jan 95 (final delivery schedule date) to 31 Dec 94. The ceiling amount of this delivery order will not be affected by this modification. This modification was generated by request of the contractor with no increase to the ceiling amount. contractor's letter dated 10 Feb 94 is incorporated to this document by reference.

ADVANCE COPY

REF 68X

CONTRACTOR COPY

68X

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. PAGE 1 OF 4

2. PROC INSTRUMENT ID NO. (PIIN)	3. SPIIN	4. EFFECTIVE DATE	5. REQUISITION/PURCHASE REQUEST PROJECT NO.	6. BCC/DMS RATING
F33615-90-D-4010	002204	.L DATE	FY7624-94-08663	

7. ISSUED BY CODE FA8900

DEPARTMENT OF THE AIR FORCE
AIR FORCE MATERIEL COMMAND
HUMAN SYSTEMS CENTER/PKVBC
8005 9TH STREET
BROOKS AFB TX 78235-5318
Buyer: BRENDA DILLARD, HSC/PKVBB
Phone: (210) 536-4503

8. ADMINISTERED BY (IF OTHER THAN BLOCK 7) CODE S2404A

DCMAO BALTIMORE
ATTN: CHESAPEAKE
200 TOWSONTOWN BLVD, WEST
TOWSON MD 21204-5299

9. CONTRACTOR NAME AND ADDRESS CODE 69148 FACILITY CODE

ICF TECHNOLOGY
9330 LEE HIGHWAY
FAIRFAX VA 22031-1207

COUNTY: FAIRFAX
PHONE: (703) 934-3000

IF "*" FOR MULTIPLE FACILITIES SEE SECT "K"

MAIL DATE
AUG 15 1994

10. SECURITY CLAS U

11. DISCOUNT FOR PROMPT PAYMENT
NONE

1 ST - DAYS
2 ND - DAYS
3 RD - DAYS
NET DAYS
OTHER IF "*" SEE SECT "E"

12. PURCHASE OFFICE POINT OF CONTACT
MEC/M5E/MVT

13. THIS BLOCK APPLIES ONLY TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in block 17. The hour and date specified for receipt of Offers ☐ is extended ☐ is not extended

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation, or as amended by one of the following methods:

(a) By signing and returning ______ copies of this amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE ISSUING OFFICE PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

14. THIS BLOCK APPLIES ONLY TO MODIFICATION OF CONTRACTS

☐ THIS CHANGE IS ISSUED PURSUANT TO ______ THE CHANGES SET FORTH HEREIN ARE MADE TO THE ABOVED NUMBERED CONTRACT/ORDER.

☐ THE ABOVE NUMBERED CONTRACT IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (SUCH AS CHANGES IN PAYING OFFICE, APPROPRIATION DATA, ETC.) SET FORTH HEREIN.

☐ THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF ______ IT MODIFIES THE ABOVE NUMBERED CONTRACT AS SET FORTH HEREIN.

☒ THIS MODIFICATION IS ISSUED PURSUANT TO FAR 52.243-3, CHANGES - TIME AND MATERIALS OR LABOR HOU

15. CONTRACT ADMINISTRATION DATA

A. KIND OF MOD	B. MOD ABST RECIPIENT ADP PT	C. DATE OF SIGNATURE MODIFICATION	D. CHANGE IN CONTRACT AMOUNT INCREASE (+) DECREASE (-)	E. LOSING PO/CAO ON TRANSFER	F. GAINING PO/CAO ON TRANSFER	G. SVC/AGENCY USE
C			$			

16. ENTER ANY APPLICABLE CHANGES

A. PAY CODE	B. EFFECTIVE DATE OF AWARD	C. CONTRACT (1) TYPE (2) KIND	D. TYPE CONTR	E. SURV CRIT	F. SPL CONTR PROVISIONS	G. PAYING OFC CODE	H. DATE SIGNED	I. SECURITY (1) CLAS (2) DATE OF DD 254

17. REMARKS (Except as provided herein, all items and conditions of the contract, as heretofore changed, remain unchanged and in full force and effect.) SUBJECT: REVISION TO STATEMENT OF WORK

PROJ MNGR: SAMER N. KARMI, AFCEE/ERDW, 8001 INNER CIRCLE, BROOKS AFB, TX
FINANCE OFFICE: (SC1030)DFAS COLUMBUS CENTER, ATTN: DFAS-CO/CHESAPEAKE DIV
PO BOX 182264, COLUMBUS OH 43218-2264

18. ☒ CONTRACTOR/OFFEROR IS NOT REQUIRED TO SIGN THIS DOCUMENT ☐ CONTRACTOR/OFFEROR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN ______ COPIES TO ISSUING OFFICE

19. CONTRACTOR/OFFEROR (Signature of person authorized to sign)
BY

22. UNITED STATES OF AMERICA (Signature of Contracting Officer)
BY William M Watts

20. NAME AND TITLE OF SIGNER (Type or print)

21. DATE SIGNED

23. NAME OF CONTRACTING OFFICER (Type or print)
WILLIAM M. WATTS

24. DATE SIGNED
15 AUG 94

AFMC FORM 702, JUL 92 REPLACES AFSC FORM 702, AUG 84 WHICH IS OBSOLETE

1. Pursuant to the "Changes" Clause in Section I of the basic contract, the Statement of Work for Delivery Order 0022, dated 06 Jul 93 is superseded by the revised Statement of Work, dated 17 Jul 94. The subject delivery order ceiling amount is increased by $229,526.00.

2. As a result of paragraph 1 above, the said order is more specifically modified as set forth below:

a. SECTION A - Cover Page - The Not-to-Exceed amount in block 20 (cover page) is increased BY $229,526.00 from $3,299,352.00 to $3,528,878.00."

b. SECTION B - THE SCHEDULE

Item No	Supplies/Services		Quantity Purch Unit	Unit Price Total Item Amount
0001	CLIN Change	sec class: U	1 LO	N N

noun: SAMPLING, ANALYSIS AND DATA
acrn: XA nsn: N
site codes: pqa: D acp: D fob: D
pr/mipr data: FY7624-94-08202, FY7624-93-08305, FY7624-94-08353, FY7624-94-08235, and FY7624-94-08663
type contract: Y

descriptive data:
Conduct work in accordance with the Statement of Work (SOW) of this order, dated 17 JUL 94 and Section C, The Description/Specifications of the Basic contract. Submit data in accordance with Attachment #1, the Contract Data Requirements List (CDRL) of the basic contract as implemented by paragraph VI of this order's SOW. This modification adds $83,590.00 to the price for CLIN 0001.

Item No	Supplies/Services		Quantity Purch Unit	Unit Price Total Item Amount
0002	CLIN Change	sec class: U	1 LO	N N

noun: SAMPLING, ANALYSIS AND DATA
acrn: XA nsn: N
site codes: pqa: D acp: D fob: D
pr/mipr data: FY7624-94-08202, FY7624-93-08305, FY7624-94-08353, FY7624-94-08235, and FY7624-94-08663
type contract: Y

descriptive data:
Provide support in accordance with the Statement Work (SOW) of this order, dated 17 JUL 94 and Section C, The Description/Specification of the basic contract. This modification adds $128,148.00 to the price for CLIN 0002.

SECTION B - THE SCHEDULE (Cont'd)

Item No	Supplies/Services		Quantity Purch Unit	Unit Price Total Item Amount
0004	CLIN Change	sec class: U	1 LO	N N

noun: CHEMICAL ANALYSES
acrn: XA nsn: N
site codes: pqa: D acp: D fob: D
pr/mipr data: FY7624-94-08353, FY7624-94-08235, and
FY7624-94-08663
type contract: Y

descriptive data:
This modification adds $17,788.00 to the price
for CLIN 0004.

c. SECTION C - Description/Specs - The SOW for this order entitled "Installation Restoration Program Remedial Investigation/Feasibility Study, Distant Early Warning (DEW) Line Sites and Cape Lisburne AFS, AK", dated 17 Jul 94 is attached hereto as Attachment #1 to this modification.

d. SECTION F - Supplies Schedule Data - The delivery schedule is modified as set forth below:

Item No	Supplies Schedule Data		Delivery Quantity	Schedule Date
0001	CLIN Del Sch Change acrn: XA ship to: U	sec class: U	1	95APR01
0002	CLIN Del Sch Change acrn: XA ship to: U	sec class: U	1	95APR01
0004	CLIN Del Sch Establish acrn: XA ship to: U	sec class: U	1	95APR01

e. SECTION G - Accounting Classification Data:

ACRN	Acct Class data	Appropriation/Lmt Subhead/CPN Recip DODAAD Supplemental Accounting Classification		Obligation Amount
AC	ACCOUNT ESTABLISH UNCLASSIFIED	5743400	F74400	$229,526.00+
		304 7431 434419 040000 53440 000000 674400		

pr/mipr data:
FY7624-94-08663

XA SPECIAL ACRN CHANGE
UNCLASSIFIED

descriptive data:
Special ACRN XA funds CLINs 0001, 0002, and 0004 and includes the following:

AA:$ 299,855.00
AB:$ 99,986.00 (mod 0022.01)
:$2,899,511.00 (mod 0022,02)
AC:$ 229,526.00 (mod 0022-04)
TOTAL $3,528,878.00

FINANCE OFFICER: Pay funds in alphabetical order.

3. All other terms and conditions remain unchanged.

1994 JUL 17 ~~1993 JUL 6~~

STATEMENT OF WORK
INSTALLATION RESTORATION PROGRAM
REMEDIAL INVESTIGATION/FEASIBILITY STUDY

~~STAGE 1~~

DISTANT EARLY WARNING (DEW) LINE SITES and CAPE LISBURNE AFS, AK

I. DESCRIPTION OF WORK

1.1 Scope

1.1.1 **Background.** The objective of the Air Force Installation Restoration Program (IRP) is to assess past hazardous waste disposal and spill sites on Air Force installations and develop remedial actions consistent with the National Contingency Plan (NCP) for those sites which pose a threat to human health and welfare or the environment. This objective is achieved through a Remedial Investigation Feasibility Study (RI/FS) process in which conclusions and recommendations drawn from accurate and validated data are used to structure and guide subsequent activities.

The RI/FS process includes scoping to define data requirements and objectives, a remedial investigation to characterize sites for a baseline risk assessment, and a feasibility study to define and evaluate alternative remedial actions so that a recommended action may be selected. Each of these steps of the RI/FS process can be conducted in stages that focus on particular aspects of the process.

The Contractor shall accomplish the actions described in this Statement of Work (SOW) to complete the RI/FS process at the following seven Dew Line Sites and Cape Lisburne:

Barter Island AFS (BAR-M); Bullen Point AFS (POW-3); Point Lonely AFS (POW-1); Point Barrow AFS (POW-M); Point Lay AFS (LIZ-2); Wainwright AFS (LIZ-3); and Oliktok Point AFS (POW-2).

1.1.2 **Requirements for Project Activities.** ~~The Installation Restoration Program (IRP) Handbook referenced in this Statement of Work provides requirements for laboratory and field activities and applicable formats for project documents that shall be used by the Contractor. Volume 1 of the Handbook dated May 1992 is provided under separate cover. This document is referenced in this Statement of Work as the Handbook.~~ The Handbook to Support the Installation Restoration Program (IRP) Statements of Work, dated September 1993, referred to in this SOW as "The Handbook," is provided under separate cover as general guidance only. Any reference within the Handbook language regarding compliance and/or formats for reports as a requirement of this Delivery Order shall be considered deleted. If a conflict is identified between this general guidance and any OSWER, U.S. Environmental Protection Agency (EPA), or other regulatory guidance or requirements, the Handbook shall be disregarded. Also, references to requirements for approval for deviations throughout the Handbook shall be considered invalid. Finally, the Method Detection Limits (MDLs) identified in the Handbook are a consolidation of numerous CFR documents which incorporate current EPA requirements. However, the Contractor shall be responsible for any updates in the CFR. The Contractor is responsible for the thorough knowledge and understanding of the previous findings and recommendations that affect this

task prior to the start of field activities. The documents involved include but are not limited to the IRP Phase I Records Search, and the IRP Phase II plans and reports addressing the Dew Line Sites and Cape Lisburne.

1.1.3 **Meetings.** ~~A maximum of two (2) Contractor personnel, including the project leader, shall attend eight (8) meetings at Elmendorf AFB, AK. Each meeting shall be two (2) 8-hour workdays in duration.~~ All meetings shall be coordinated by the Restoration Team Chief (RTC).

1.1.4 **Special Notifications.** The Contractor shall immediately report to the RTC via telephone, any data or results generated during this investigation which may indicate an imminent health risk. Following this telephone notification, a written notice shall be prepared and delivered within three (3) days. This notification shall include supporting documentation (sequence 16, para 6.1)

1.2 Project Scoping Documents

The purpose of the project scoping documents is to clearly and comprehensively define project activities prior to the initiation of field work. The Contractor shall prepare and submit the following project scoping documents for this task prior to the initiation of any field activities, removal actions, or laboratory analyses.

1.2.1 **Engineering Network Analysis.** Provide within ten (10) days after the issuance of an order a computer generated network analysis which is a detailed task plan for the RI/FS work efforts. The network analysis (GANTT) chart shall be in the form of a progress chart of suitable scale to indicate appropriately the percentage of work scheduled for completion by any given date during the period of the delivery order. The network analysis (GANTT) shall show both serial and parallel subtasks leading to a deliverable product or report, and shall show early and late start and completion dates with float. The network analysis (GANTT) shall be updated and submitted quarterly (sequence 3, para 6.1).

1.2.2 **Work Plan.** This section will discuss the overall approach, (including a brief summary of the Conceptual Site Model and Data Quality Objectives), major tasks, scope, timeline, and major decision points. Due to the extreme remoteness of the Dew Line Sites and Cape Lisburne, the Contractor shall include a detailed plan for logistics and strategy to complete the RI/FS field activities. Follow the format specified in section 1 of the Handbook. In preparing the Work Plan, use previous reports and the information gathered during the literature search and presurvey along with experience at similar sites. Reevaluate the recommendations for Dew Line Sites and Cape Lisburne developed during previous IRP stages. The Contractor shall also prepare a draft and final addendum to the existing DEW Lines RI/FS work plan. The addendum shall detail the removal activities occurring at Cape Lisburne LRRS pursuant to paragraph I.1.3.14 of this SOW. (sequence 4, para 6.1).

1.2.3 **Sampling and Analysis Plan (SAP).** The SAP consists of a quality assurance plan (QAPP) and a Field Sampling Plan (FSP). Prepare a SAP describing how project activities will be accomplished in the format specified in section 1 of the Handbook. The Contractor shall also prepare a short addendum to this basic SAP which focuses on those sampling and analysis activities undertaken as part of the removal action specified in paragraph I.1.3.14 of this SOW. Incorporate review comments and obtain RTC concurrence prior to the start of field activities (sequence 4, para 6.1).

1.2.4 **Health and Safety Plan (HSP).** Provide a written Health and Safety Plan within eight (8) weeks after the issuance of an order. The Contractor shall also prepare an addendum to the existing DEW Lines RI/FS HSP, concerning removal activities conducted pursuant to paragraph I.1.3.14 of this SOW. The Contractor shall comply with USAF, OSHA, EPA, state, and local health and safety regulations regarding the proposed work effort. Use EPA guidelines for designating the appropriate levels of protection needed at the study sites. The Health and Safety Plan shall provide no less protection than the protection contained in the manual entitled "Health and Safety Requirements for Employees Engaged in Field Activities" dated 1981 and the "Occupational Safety and Health Manual for Hazardous Waste Sites Activities" dated 1985 and 29 CFR 1910. Coordinate the Health and Safety Plan directly with applicable regulatory agencies prior to submittal to AFCEE/ESR. The Contractor shall certify to AFCEE/ESR that the Contractor has reviewed the coordinated Health and Safety Plan with each employee and also subcontractor's employees prior to the time each employee engages in field activities (sequence 4, para 6.1).

1.2.5 **Community Relations Plan.** The Contractor shall prepare a Community Relations Plan (CRP) for the DEW Line Sites and Cape Lisburne AFS outlining the specific public communications and involvement techniques to be used in coordination with remedial site activities (sequence 4, para 6.1). Follow the guidance contained in "Community Relations in Superfund, a Handbook", office of Solid Waste and Emergency Response (OSWER) Directive 9230.0-03C (EPA/540/R-92/009, January 1992, PB92-963341), and other applicable directives. Also, use as a guidance previously accomplished CRP from other installations in Alaska. Appropriately adapt such guidance to the local situation at the DEW Line Sites and Cape Lisburne. As described in OSWER Directive 9230.0-03C, the CRP shall include, but not be limited to, a description of the sites and the community, an overview of the community involvement to date, key community concerns regarding the site and AF site activities, and suggested community relations activities. A contact list of elected officials, agency representatives, and interested groups and individuals shall be included in appropriate copies of the plan. In addition, the plan will include suggested locations for meetings and information repositories. Contractor activities to develop the CRP shall include conducting a review of site information provided by the AF.

1.3 Project Activities

The Contractor shall conduct the following tasks to achieve the purposes stated herein, in compliance with approved scoping documents, the Handbook, and all applicable regulations and requirements.

1.3.1 **Community Relations.** Provide support to the base public affairs office for the tasks described below pertaining to the RI/FS Community Relations Program.

1.3.1.1 Public meetings and workshops. The Contractor shall be responsible for coordinating public meetings and workshops for all DEW Line Sites and Cape Lisburne AFS. This includes producing briefing scripts, slides and any associated products such as response cards and sign-in sheets. As requested by the base Community Relations office in coordination with the RTC, research and provide materials for public queries, news media queries, and news releases. Assume a maximum of one (1) workshop/meeting (Seq. nos. 3,9).

1.3.1.2 Public notices. As required by the base Community Relations office and the RTC, the Contractor shall prepare and publish public notices for the Fairbanks and local newspapers. The purpose of these notices is to inform the public of a meeting, workshop, or comment period in which they have the opportunity to be involved in the IRP Program at DEW Line Sites and Cape Lisburne AFS. Also, these notices may be utilized to inform the public of other pertinent program information such as quarterly notices of documents placed in the information repositories. The format for the notices shall be coordinated with the Community Relations office and RTC, and then submitted to the RTC for review prior to delivery to the base. Assume a maximum of two (2) notices (Seq. no. 3).

1.3.1.3 Photo Notebook. The Contractor shall develop a photo notebook which focuses on the overall IRP program at DEW Line Sites and Cape Lisburne AFS. The layout of the notebook will be coordinated with the public affairs office and RTC. Assume a maximum of one (1) update (Seq. no. 9).

1.3.1.4 Mailing List. In coordination with the base Community Relations office and the RTC, prepare and update the mailing list on a quarterly basis. Assume a maximum of two (2) updates (Seq. no. 3).

1.3.1.5 Maps. Prepare presentation quality maps of the installations and their sites to use in newsletters and to distribute to the public.

1.3.1.6 Information Repository/Administrative Record. Prepare a listing of all documents required for the Information Repository and Administrative Record. Create an Information Repository and Administrative Record. The Repository and Record will be maintained by the 11 CEOS/CEVR Community Relations Coordinator. Assume two locations for the Repository and Record, one in Anchorage and another in Elmendorf AFB, AK. Actual locations will be determined by the 11 CEOS/CEVR Community Relations Coordinator.

1.3.2 **Literature Search.** Conduct a literature search and analyze aerial photos of the DEW Line Sties to supplement existing information that has been collected. The purpose of the literature search is to complete the conceptual site model so that a numerical estimate of risk can be developed.

1.3.3 **Presurvey.** Within eight weeks of the issuance of an order, the Contractor shall visit the Dew Line Sites and Cape Lisburne to ensure complete understanding of site conditions. Coordinate this visit with the RTC and the 11 CEOS project manager. The Contractor shall look for evidence of contamination at each site visited (e.g., leaking drums, vegetative stress, leachate seeps). The Contractor shall observe the physical settings of each site visited to formulate specific recommendations concerning boring placement, use of geophysical techniques, and other aspects of the proposed field investigation. The findings of the presurvey shall be used to prepare the Work Plan, SAP, and HSP for the RI and to prepare scoping documents for the treatability study(ies). Assume one presurvey and one reconnaissance trip.

1.3.4 **Quality Assurance/Quality Control (QA/QC).** A QA/QC program shall be conducted and documented for all work pursuant to this delivery order. Contractor and project-specific documents concerning QA/QC procedures and requirements shall be strictly followed. Data generated under the QA/QC program shall be used by the Contractor for evaluating the analytical results and field records assembled for each site to identify accurate and validated data that may be used to assess risk, develop conceptual site models and evaluate alternatives.

1.3.5 **Conceptual Site Model.** Use all available RI/FS data supported by acceptable QA/QC results (as measured against QAPP requirements) and site characterization information to refine, based on newly collected data, the conceptual site model. The model shall define the nature and extent of contamination and the transport and fate of those contaminants. The minimum requirements of the model are given in section 2 of the Handbook. The complexity and detail of the site model shall be consistent with the nature of the site and site problems, and the amount of data available the conceptual site model shall be documented in the Work Plan.

1.3.6 **ARARs Evaluation.** The Contractor shall identify all Applicable or Relevant and Appropriate Requirements (ARAR). These ARARs will be documented in the Work Plan.

1.3.7 **Data Collection, Sampling, and Analysis Procedures.** The Contractor shall conduct field activities, sampling, laboratory analysis, and data quality assessment. Section 2 of the Handbook is recommended for the Contractor to follow. The Contractor shall conduct all activities in accordance with the WP and the SAP approved by the COR. The COR shall be notified in writing of any planned deviation from the activities specified in these documents. COR approval of deviations is required prior to performance. The Contractor shall ensure that all analyses and analytical methods' QA/QC requirements are being met at all times before and during the analysis of samples.

The field investigation (including all drilling and sampling operations) shall be supervised by a registered geologist, hydrogeologist, or professional engineer. If required by the state, the on-site field supervisor shall be certified by the state to install test wells. A detailed log of field conditions, materials penetrated during drilling, well completion, and sampling conditions, as described in Section 2 of the Handbook, shall be maintained and made available for Government inspection upon request. Decisions on well and boring locations, well depths, screened intervals, and all details of the field investigation shall be made by the COR, and the Contractor's field or project supervisor.

1.3.8 **Regulatory Requirements and Permits.** All well drilling, development , sampling, laboratory analysis, and other activities pursuant to this effort shall be conducted in strict accordance with all applicable federal and state laws, ordinances, rules and regulations, and all authorities with jurisdiction over such activities. The Contractor shall complete permits, applications, other documents, and proficiency tests required by the regulatory agencies. The Contractor shall file documents with appropriate agencies and pay all applicable permit and filing fees. The Contractor shall identify locations requiring permits to Radar Station Manager. The Contractor shall include all correspondence in appendices to the technical reports in accordance with Section 4 of the Handbook.

All laboratory analyses shall conform to all applicable federal, state, and local regulatory agency requirements. If the requirements specify that certification is necessary to conduct one or more specific analyses, the Contractor shall furnish documentation showing laboratory certification with the first set of analytical data supplied to AFCEE/ESR and the COR.

The Contractor shall containerize and sample materials suspected to be hazardous in accordance with applicable requirements, Guidance from the Handbook, and the approved Plans. The Contractor shall transport these containerized materials to a location within the installation boundary designated by the Radar Station Manager at a frequency specified by the

Station Manager. The Contractor shall handle, store, and/or dispose of potentially hazardous materials. The Contractor shall transport and empty containerized materials determined not to be hazardous to locations within the installation boundary identified by the Station Manager.

1.3.9 **Remedial Investigation (RI).** The Contractor shall conduct a RI to characterize environmental conditions; define the concentration, nature, and extent of contamination; and quantitatively estimate the risk to human health and the environment and study the area through the collection of geologic and hydrologic data, environmental samples, the laboratory analyses of those samples for potential contaminants, the evaluation of the analytical results and field measurements with respect to quality control data, and the interpretation and analysis of accurate and precise data. The purpose of data collection, sample collection, and laboratory analysis is to determine whether any contaminants generated from installation activities have entered the environment. The field investigation is used to determine the source of any identified contaminants, the magnitude of contamination relative to Applicable or Relevant and Appropriate Requirements (ARARs), and any naturally occurring or background concentrations for specific compounds. The RI shall comply with the specifications, procedures, and methodologies presented in the project-specific SAP. The COR must be notified in writing prior to any modification of or deviation from any activity described in these documents.

1.3.9.1 **Soil Borehole Drilling and Sampling and Well Installation and Sampling.** The Contractor shall drill and collect samples from boreholes as specified in the SAP. The Contractor shall evaluate the need to install, sample, and develop monitoring or extraction wells.

1.3.9.1.1 **Lithologic Samples.** The Contractor shall describe core samples at least every five (5) feet of drilling or at each change in lithology, whichever is less, to indicate significant changes in lithology of characteristic properties that relate to the strata penetrated. Any deviations shall be coordinated with the COR. Guidance for standard identification practices are found in the Handbook. The Contractor shall include in the field logbook observations made by the driller and rig geologist during drilling such as depth to water, penetration rate, drill rig behavior, and other observations that might be indicative of changes in formation characteristics. The Contractor shall record depth to permafrost in all the soil borings and shall not proceed beyond five (5) feet into the permafrost layer.

1.3.9.1.2 **Drill Cuttings and Drilling Fluids.** The Contractor shall containerize all drill cuttings and drilling fluids. All drill cuttings and drilling fluids shall be managed and disposed of in accordance with the project SAP. (Note: The Contractor shall be responsible for providing all necessary containers.) The Contractor shall be responsible for the logistics of the ultimate disposal of all drill fluids or drill cuttings deemed hazardous in accordance with current EPA off-site disposal policy and state and/or local hazardous waste disposal laws. The contractor shall coordinate with the Station Manager for on-site placement and disposal of all drill cuttings, fluids, purge fluid, and excavated material. If on-site disposal is excluded, all hazardous waste shall be transported by a permitted hazardous waste transporter to a licensed Resource Conservation and Recovery Act (RCRA) approved facility and be accompanied by a Uniform Hazardous Waste Manifest. The Contractor shall provide a final, completed copy of the hazardous waste manifest to the 11 CEOS/CEVR. The Radar Stations' hazardous waste managers will sign all hazardous waste manifest documents.

1.3.9.1.3 **Well/Boring Precautions.** The Contractor shall mark the field locations of all borings during the planning/mobilization phase of the field investigation. The Contractor shall consult with base personnel to minimize the disruption of base activities, to properly position wells with respect to site locations, and to avoid penetrating underground utilities. The Contractor shall obtain all permits prior to commencement of digging and drilling operations. The Contractor shall utilize a registered land surveyor in determining the elevations and locations of all off-base background study borings. All borings and wells from which samples are taken shall be surveyed by the Contractor for vertical and horizontal control. The Contractor shall record the positions on project and site specific maps. Bench marks used must have been previously established from and be traceable to a U. S. Coast and Geodetic Survey (USCGS) or U. S. Geological Survey (USGS) survey marker. Clearly identify all bench mark locations on the base map.

1.3.9.1.4 **Water-Level Measurements in Boreholes.** The Contractor shall measure water levels in all boreholes after the water level has stabilized. Include this information and the date of measurement in the boring logs. Also, record soil moisture conditions (moist, wet, saturated, etc.) in the boring log.

1.3.9.1.5 **Air Monitoring During Drilling.** The Contractor shall monitor the ambient air in the breathing zone above the borehole during all drilling with an appropriate organic vapor analyzer to identify potentially hazardous and/or toxic vapors. Include air monitoring results in borehole logs.

1.3.9.1.6 **Subsurface Soil Sampling.** The Contractor shall collect soil samples from borings as specified in the SAP. The SAP specifies the analytical methods, the parameters for analysis, and the estimated number of analyses for soil samples.

1.3.9.1.7 **Well Construction Requirements.** The Contractor shall coordinate with the COR to determine well completion requirements (flush or projected above ground surface). All wells shall be secured as soon as possible after drilling. The Contractor shall provide corrosion resistant locks for both flush and above-ground well assemblies. The locks shall be compatible with existing wells. The Contractor shall turn the lock keys over to 11 CEOS/CEVR POC following completion of the field effort. The Contractor shall coordinate with the 11 CEOS/CEVR POC, the RTC, and the COR the selection of exact well and screen placement, gravel pack design, and screen slot size.

1.3.9.1.8 **Well Logs.** For each well, the Contractor shall prepare a well completion log and schematic diagram showing well construction details. Lithologic descriptions, well elevation survey data, and other information included in the well logs shall conform to the specifications of the SAP.

1.3.9.1.9 **Well Development.** The contractor shall develop each well as soon as possible. Guidance for well development procedures are found in the Handbook. The Contractor shall measure the rate of water production, pH, specific conductance, and water temperature during well development.

1.3.9.1.10 **Well Placement.** The Contractor shall avoid installing wells in depressions or areas subject to frequent flooding and/or standing water. If wells must be installed in such areas, the Contractor shall design the wells so standing water does not leak into the top of the casing or cascade down the annular space.

1.3.9.1.11 **Well and Borehole Clean-up.** The Contractor shall clean the area following the completion of each well and borehole. The Contractor shall return all sites to the original condition of the site.

1.3.9.1.12 **Groundwater and Surface Water Sampling.** The Contractor shall collect groundwater and Surface Water samples from newly developed well and existing wells and from surface water bodies. The SAP shall specify the analytical methods, the parameters for analysis, and the estimated number of analyses for groundwater and surface water samples.

1.3.9.1.13 **Composite Sampling.** The Contractor shall collect and analyze drill cuttings, fluids, purge fluids, and excavated material. The SAP shall specify the analytical methods, the parameters for analysis, and the estimated number of analyses for composite samples.

1.3.9.2 **Geophysical Surveys.** The Contractor shall evaluate whether geophysical surveys are needed (e.g., to determine boundaries of landfills, to locate underground debris, utilities and storage tanks). Where geophysical surveys are appropriate, the Contractor shall select a geophysical survey technique or techniques [such as ground penetrating radar (GPR), magnetometer or electromagnetic surveys (EM)] that will best meet the desired application. The technique(s) used shall be approved by the RTC prior to use. Approximate number of surveying days is included in Annex A which is to be used for costing purposes only. Appropriate grid systems shall be established and the Contractor shall use the results of this survey to prepare a contour map of the results. Provide this map as an attachment to the first R&D Status Report submitted after the completion of the geophysical surveys. The Contractor shall perform the geophysical surveys before drilling and use the results in selecting the location of soil borings, wells, test pits, if necessary.

1.3.9.3 **Permeability Testing.** The Contractor shall determine the need for a permeability test at Cape Lisburne AFS, to provide additional data on the hydrogeologic characteristics of the water table aquifer. The SAP shall specify the method to be used for the permeability test.

1.3.9.4 **Water Level Measurement.** The Contractor shall evaluate the need for conducting a complete round of water level measurements in all existing and new wells at Cape Lisburne AFS at the beginning of field work and during the field sampling effort. Data gathered shall be used for interpreting groundwater flow directions and groundwater gradient.

1.3.9.5 **Soil Gas Surveys.** The Contractor shall evaluate the need for soil gas surveys and Hydropunch (e.g., to select soil boring locations). If soil gas surveys and hydropunch are included as part of the approved Work Plan and FSP, the Contractor shall establish appropriate grid systems. The Contractor shall prepare a posting map of soil gas values relative to their location on the grid used. Provide this map as an attachment to the first R&D Status Report submitted after completion of the soil gas survey (sequence 3, para 6.1). Approximate number of surveying days are included in Annex A which is to be used for costing purposes only.

1.3.9.6 **Groundwater Field Screening.** The Contractor shall perform groundwater field screening. The SAP shall specify the method, location, and type of groundwater field screening.

1.3.9.7 **Baseline Risk Assessment.** The Contractor shall use data supported by acceptable QA/QC results (as measured against QAPP requirements) and the conceptual site model to numerically estimate the risk posed by site contaminants to human health and the environment. The Contractor shall identify and list all ARARs for those contaminants detected in environmental

samples at the site. The Contractor shall provide all ARARs evaluations as an attachment to the Technical Report. Provide the results of the baseline risk assessment in the Technical Report using the formats in Section 4 of the Handbook as a guidance.

The Contractor shall identify those sites posing minimal or no threat to human health, welfare, or the environment and for which no further action is appropriate.

The Contractor shall use the results of the risk assessment in establishing remedial action objectives and developing remedial alternatives in the Feasibility Study.

1.3.9.8 **Defense Priority Model Scores.** The Contractor shall use the Defense Priority Model to score the sites. The score shall be included as an appendix to the RI/FS Technical Report.

1.3.9.9 **Fate and Transport.** The Contractor shall perform fate and transport modeling for contaminants of interest to include the projection of future contaminant concentrations within the boundaries of the site. This will be done in conjunction with the RI/FS report.

1.3.10 **Feasibility Study (FS).** The Contractor shall perform a FS concurrently with the RI. As much of the FS as possible shall be performed early in the RI/FS process and refined as additional RI data are obtained. The Contractor shall use the information from the RI and the baseline risk assessment to develop and evaluate remedial action alternatives for each site where a threat to human health or the environment exists. The Contractor shall follow the procedures specified in USEPA OSWER Directive 9355.3-01, "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA." The Contractor shall employ streamlining methods wherever possible and develop and evaluate the minimum number of alternatives needed to provide a range of promising treatment and containment actions. The Contractor shall eliminate impracticable alternatives from further consideration early in the FS process. The scope and level of detail shall be consistent with the nature and complexity of site problems.

1.3.10.1 **Develop and Screen Alternatives.** The Contractor shall establish remedial action objectives and remediation goals for protecting human health and the environment. These objectives and goals shall be determined based on identified ARARs and acceptable exposure levels as defined in the baseline risk assessment and refined throughout the RI/FS process. Identify general response actions and applicable technologies based on site and contaminant conditions, and combine technologies to formulate distinct alternatives. The Contractor shall develop alternatives which eliminate, control, and /or reduce risk to human health or the environment to acceptable levels for each pathway. Where a wide variety of promising alternatives exists, the Contractor shall screen the alternatives based on effectiveness, implementability, and cost. The Contractor shall detail the development and screening of the alternatives process and identify the alternatives selected for detailed analysis in the Informal Technical Information Report (ITIR).

1.3.10.2 **Detailed Screening of Alternatives.** The Contractor shall conduct a detailed analysis on each alternative selected and identified in the above step and approved by the COR. Using the methodology in OSWER Directive 9355.3-01, the Contractor shall evaluate each alternative against the nine criteria. In addition to the individual assessment, the Contractor shall perform a comparative analysis to determine the relative performance of alternatives. The Contractor shall focus the analysis on sub-factors and criteria most pertinent to each site and the scope and complexity of the

proposed action. Provide a summary of the Detailed Analysis of Alternatives in the R&D report submitted following task completion. Include summary tables of the individual and comparative analyses that will be used in the Technical Report.

1.3.11 **Decision Documents.** The Contractor shall prepare and submit Decision Documents (DD) following the Handbook Section 4.4 as guidance. The purpose of the DD is to support a remedial action alternative or a no further action alternative. The Contractor shall submit an Interim Decision Document detailing the removal action process, results and conclusions.

1.3.12 **Site Specific Requirements.** The Contractor shall perform the requirements listed in this SOW in conformance with the guidance of the Handbook, requirements of the approved WP, and the SAP. Annex A specifies the proposed values for field and laboratory activities to be conducted, specifications for field activities, information for sediment and soil samples, analytical methods, parameters for analysis, estimated number of analyses for water/sediment/soil samples, required analytical methods, estimated number of analyses for all core samples, estimated number soil gas analyses for each parameter, and field QC sample requirements for soil and water samples for costing purposes only.

1.3.13 **Weekly Field Activity Report**

The contractor shall transmit a Weekly field activity report. The reports shall include, but not be limited to, all field work detailed in this SOW, a listing of any problems encountered (e.g., equipment problems, equipment downtime), and actions taken to resolve those problems. ~~The AFCEE RTC shall develop the format for the report.~~

1.3.14 **Removal Actions**

The Contractor shall complete the following tasks to remove or otherwise control source contamination and further characterize site conditions at Cape Lisburne LRRS. The Contractor shall include any data generated during these activities in the pertinent reports.

1.3.14.1 **Task 1** involves placement of an interceptor trench (French drain) below Petroleum, Oil, and Lubricant (POL) Tanks 1 and 2 to capture spilled or leaked petroleum products which are currently migrating through the subsurface toward a nearby surface water body. Collected material shall drain to a sump for separation into its water and petroleum components. Accumulated water shall be treated using granulated activated carbon or appropriate vapor control technology, chemically analyzed for the presence of remaining contaminants, and subsequently, in coordination with Alaska Department of Environmental Conservation (ADEC), disposed of according to all applicable water regulations. Recovered petroleum product will be incinerated on-site, after coordination ADEC. Soils excavated to accommodate the trench may be returned to the surrounding land, provided that they are not considered hazardous under the RCRA "contained-in" policy. Soils which are deemed hazardous may be drummed and sent for off-site disposal according to applicable hazardous waste regulations, or may be stored on-site pending subsequent remedial activities.

1.3.14.2 **Task 2** requires the removal and off-site disposal of a sludge pile located at Landfill and Waste Accumulation Area Number 1. Using a backhoe provided by the base, the sludge pile shall be excavated,

containerized in 55-gallon drums, and transported to a disposal facility in the continental U.S. A temporary drum staging area shall be established nearby to store the drums until they are transported. Current plans may involve shipment of waste on the barge's return trip to Cape Lisburne. Prior to field operations on this task, a representative sample of the sludge must be collected and analyzed using TCLP and other characteristic methods to determine if the material is a hazardous waste. The sludge must be managed and disposed of according to the results of such analyses. After removal of the sludge, the excavated area must also be sampled and analyzed to detect any constituents remaining at the site.

1.3.14.3 **Task** 3 involves limited PCB sampling and analysis. The purpose of this task is twofold: to further characterize contamination in ocean sediments adjacent to Landfill and Waste Accumulation Area Number 1, and to locate a reported "hot spot" undiscovered during the 1993 RI/FS sampling program.

1.4 Project Deliverables

Deliver the following documents in compliance with the requirements of item VI, the formats required in section 1 and 4 of the Handbook, and the specifications noted below. Draft reports are considered "drafts" only because they have not been reviewed and approved by the Air Force. In all other respects, "drafts" shall be complete, in the proper format, fully illustrated, and free of grammatical and typographical errors.

1.4.1 Scoping Documents.

a. Engineering Network Analysis (GANTT) (para 1.2.1). Provide within ten (10) days after the issuance of an order. Update and submit quarterly (sequence 3, para 6.1).

b. Work Plan (para 1.2.2). Use the format in section 1 of the Handbook (sequence 4, para 6.1).

c. Sampling and Analysis Plan (1.2.3). Use the format in section 1 of the Handbook (sequence 4, para 6.1).

d. Health and Safety Plan (para 1.2.4). Provide within six (6) weeks after the issuance of an order (sequence 4, para 6.1).

e. Community Relations Plan (para 1.2.5). Provide within eight (8) weeks after issuance of an order (sequence 4, para 6.1).

1.4.2 **Special Notification.** Provide written notification of imminent health hazards and supporting documentation within three (3) days of telephone notification (sequence 16, para 6.1).

1.4.3 **Presentation Materials.** The Contractor shall prepare and present up to two (2) presentation packages at meetings coordinated by the Air Force (sequence 9, para 6.1). Attendance of these meetings is included in paragraph 1.1.3 of this SOW. As part of the presentation materials, the Contractor shall provide paper copies of all slides and overheads.

1.4.4 **Meeting Summaries** (para 1.1.3). Provide no later than five (5) days after conclusion of each meeting (sequence 18, para 6.1).

1.4.5 **Newsletter.** Prepare and submit a quarterly newsletter which presents the status of the entire base IRP Program. This will include preparing an outline resulting from input by all Contractors involved in the program. The outline must be approved by the base and RTC prior to submittal of the newsletter. The final product will be printed and distributed as agreed to by the RTC. Assume a maximum of two (2) newsletters (Sequence no. 3).

1.4.6 **Fact Sheets.** As required by the base IRP Program, prepare and submit fact sheets which facilitate the public's understanding of the IRP Program. These sheets should include key community concerns regarding sites as specified by the base. Use the format agreed to by the base and RTC. Print and distribute the fact sheets as agreed to by the RTC. Assume a maximum of two (2) fact sheets (Sequence no. 3).

1.4.7 **Public Notices.** In accordance with paragraph 1.3.6.2, prepare and submit public notices for the Fairbanks and local newspapers. Use the format agreed to by the base and RTC (Sequence no. 3).

1.4.8 **Photo Notebook.** In accordance with paragraph 1.3.6.3, develop a photo notebook which focuses on the overall base IRP Program. The Contractor shall include photos of sites under investigation, field and removal activities, and sample locations. Photos shall reflect proper sampling techniques, QA/QC procedures, and Health and Safety reports during field activities. Prior to implementation, submit a conceptual layout of the notebook for review by the base and RTC (Sequence no. 9).

1.4.9 **Mailing List.** In accordance with the base Community Relations coordinator and paragraph 1.3.6.4, update the existing mailing list on a quarterly basis (Sequence no. 3).

1.4.10 **Maps.** In accordance with the base community Relations coordinator and paragraph 1.3.6.5, prepare presentation quality maps.

1.4.11 **Information Repository/Administrative Records.** Submit the Information Repository and Administrative Records in accordance with Air Force Guidance and in concurrence with the COR and the base Community Relations Coordinator. (sequence no. 4, para 6.1)

1.4.12 **Data Management.** The Contractor shall meet the data deliverable requirements of the Installation Restoration Program Information Management System (IRPIMS). The Contractor shall be responsible for recording field and laboratory data into a computerized format as required by the most current version of the IRPIMS Data Loading Handbook (mailed under separate cover). In order to perform this task, the Contractor shall use the IRPIMS Quality Control Tool (QC Tool) and PC software utility (mailed under separate cover with software manual) to quality check ASCII data files and to check all data files for compliance with requirements in the IRPIMS Data Loading Handbook. Upon request, the IRPIMS Contractor Data Loading Tool (CDLT) is available. This PC software is designed to assist the Contractor in preparing the various ASCII data files.

Individual IRPIMS data files (e.g., analytical results, groundwater level data, etc.), including resubmissions, shall be delivered with a transmittal letter by the Contractor to the Air Force Center for Environmental Excellence (AFCEE) in sequence according to a controlled time schedule as identified in the current version of the IRPIMS Data Loading Handbook. The Contractor shall include a copy of the Quality Control Tool error report, i.e., output from the QC tool, for each IRPIMS file submission. The error report shall be

submitted both in hard copy and as an electronic file on the submission disks with the filename of the error report identified in the transmittal letter (SEQUENCE No. 3).

All Contractor data deliverables shall be sent to:

AFCEE/ESD BLDG 624W
ENVIRONMENTAL RESTORATION DIVISION
ATTN: IRPIMS Data Management
Brooks AFB, TX 78235-5000

In addition, the Contractor shall provide a copy of the transmittal letter to the Air Force contracting office responsible for the contract, HSC/PKV (Brooks AFB, TX, 78235-5000) for AFCEE contracts. This letter shall identify the files included or otherwise omitted (with an appropriate explanation), the Government contract and delivery order number, and the Air Force POC that is responsible for monitoring the Government contract.

The Contractor shall be responsible for the accuracy and completeness of all data submitted. All data entered into the IRPIMS data files and submitted by the Contractor shall correspond exactly with the data contained in the original laboratory reports and other documents associated with sampling and laboratory contractual tasks.

Each file delivered by the Contractor will be electronically evaluated by AFCEE/ESD for format compliance and data integrity in order to verify acceptance. All files delivered by the Contractor are required to be error-free and in compliance with the IRPIMS Data Loading Handbook. Any errors identified by AFCEE/ESD in the submission shall be corrected by the Contractor.

1.4.13 **Decision Document.** The Contractor shall prepare and submit DD as described in Section 1.3.11 (SEQUENCE No. 4, para 6.1).

1.4.14 **Technical Reports.** Summarize the findings of the tasks pursuant to the SOW, integrate them with the results of all pertinent previous studies, and formulate conclusions and recommendations for future efforts in Technical Reports.

1.4.14.1. **Remedial Investigation (RI) Report** (para 1.3.3). Provide a RI Report following the format in section 4 of the Handbook (sequence 4, para 6.1).

1.4.14.2. **Risk Assessment (RA) Report** (para 1.3.3.7). Provide a RA Report following the format in section 4 of the Handbook (sequence 4, para 6.1).

1.4.14.3 **Feasibility Study Report** (para 1.3.4). Provide a Feasibility Study Report following the format in section 4.0 of the Handbook. (sequence 4, para 6.1).

1.4.14.4 **RI/FS Technical Report** (para 1.3.3). Provide a RI/FS Technical Report following the format in section 4.0 of the Handbook. The RI/FS Technical Report shall integrate the RI, RA, and FS reports. Provide two microfiche copies with the final RI/FS Technical Report (sequence 4, para 6.1).

1.4.15 **Basewide Comprehensive IRP Document.** The Contractor shall develop a comprehensive document that summarizes both the historic and projected IRP activities. This document shall be used as management tool to efficiently guide future IRP activities at the DEW Line Sites and Cape Lisburne AFS. The Contractor shall follow the outline developed by the AFCEE RTC. Assume two (2) updates (sequence no. 4)

1.4.16 **Analytical Data ITIR.** Prepare and submit the following ITIRs, as well as the Analytical Data ITIR itself:

a. Development & Screening of Alternatives (para. 1.3.10.1). Submit the results of the development and screening of alternatives in an ITIR prepared in compliance with section 3 of the Handbook (sequence 3, para 6.1)

b. Detailed Screening of Alternatives (para 1.3.10.2).

c. DPM Scoring (para 1.3.9.8). Provide scores, a summary of procedures and assumptions, and Automated DPM output tables for all sites scored with DPM (sequence 3, para 6.1).

d. Mylar® Map. Construct Radar Stations' maps of Mylar using guidelines in section 3 of the Handbook. The Maps shall contain all sites and related water and sediment sampiing locations (sequence no. 3, para. 6.1). The Contractor shall create and update digitized map files. Use the digitized data file to produce the Mylar map. The Contractor shall print the revision date on the Mylar maps and the date shall be encoded in the digitized data file. Provide a copy of the revised digitized data file to AFCEE-ESO/ER (sequence 1, para. 6.2).

e. Geophysical Survey Contour Map (para 1.3.9.2). Provide a contour map showing geophysical survey results. Interpret the significance of the data in the R&D Status Report (sequence 3, para 6.1).

f. Soil Gas Map (para 1.3.9.5). Provide site maps showing soil gas data superimposed on the sampling locations and incorporate soil gas data generated by the 11 CEOS/CEOR. Interpret the significance of the data in the R&D Status Report (sequence 3, para 6.1).

g. Site Characterization Summary Informal Technical Information Report (SCS ITIR). The Contractor shall prepare the report to include the following components:

1. Source identification and contaminant delineation.

2. Identification and ranking of appropriate treatability studies for the listed sites.

3. Data and interpretations integrating the findings of the current study and all previous RI efforts at the sites.

4. Current isoconcentration plots of contaminants detected at each site, lithologic logs of each boring showing contaminants detected and relationship to other borings in the site, and cross-sections of the site showing contaminant distribution.

5. The contents and objectives of a Site Characterization Summary Informal Technical Information Report (ITIR) are specified in the Handbook. The Site Characterization Summary ITIR shall serve as a core document for the RI report. The Contractor shall submit an annotated outline of each section of the

ITIR for approval by the TPM prior to preparation of the report itself. The Contractor shall prepare the report as specified in the accepted annotated outline. The Contractor shall submit newly revised portions of the working draft ITIR in order to make available current site characterization data. A prime objective shall be to minimize the volume of comments on the working draft and final submittals by incorporating comments into the report in an on-going manner. The final summary shall contain all sites included in this effort (Sequence No. 4).

h. Weekly Field Activities Report (para 1.3.13). Transmit a Weekly field activities report during field activities pursuant to a format developed by the AFCEE RTC. (Sequence no. 4, para 6.1)

II. Site Location and Dates

Dew Line Sites and Cape Lisburne, date to be established.

III. Base Support The base will:

3.1 Provide the Contractor with existing engineering plans, drawings, diagrams, aerial photographs, digitized map files, etc., to facilitate evaluation of IRP sites under investigation.

3.2 Arrange for personnel identification badges, vehicles passes, and/or entry permits with the contention the Contractor will provide necessary information to the base personnel no less than four weeks before needed.

3.3 Provide the Contractor with all previously approved documents which provide information on all IRP efforts conducted at Dew Line Sites and Cape Lisburne and will aid in the determination of the amount of field work and analyses which need to be conducted.

IV. Government Furnished Property

Not Applicable

V. Government Points of Contact:

~~5.1 MAJCOM Coordinator~~

~~Major James R. Williams III~~
~~AFCEE/ERD~~
~~8001 Inner Circle DR STE 2~~
~~Brooks AFB TX 78235-5328~~
~~(210) 536-5243~~
~~DSN 240-5243~~
~~(210) 536-9026 FAX~~
~~DSN 240-9026~~

~~5.2 Restoration Team Chief~~

~~Mr. Michael F. McGhee~~
~~AFCEE/ERD~~
~~8001 Inner Circle DR STE 2~~
~~Brooks AFB TX 78235-5328~~
~~(210) 536-5293~~
~~DSN 240-5293~~
~~(210) 536-9026 FAX~~
~~DSN 240-9026~~

~~5.3 Base Point of Contact (POC)~~

~~Mr. Jim Wolfe~~
~~11 CEOS/CEVR~~
~~21885 Second Street~~
~~Elmendorf AFB AK 99506-4420~~
~~(907) 552-4532~~
~~DSN 317-552-4532~~
~~(907) 552-1533 FAX~~
~~DSN 317-552-1533~~

~~5.4 Public Affairs Coordinator~~

~~Ms. Wende Wolf~~
~~11 CEOS/DEVR~~
~~21885 Second Street~~
~~Elmendorf AFB AK 99506-4420~~
~~(907) 552-4532~~
~~DSN 317-552-4532~~
~~(907) 552-1533 FAX~~
~~DSN 317-552-1533~~

VI. Deliverables

6.1 Attachment 1 of the Basic Contract

Sequence numbers 1 and 5 listed in attachment 1 to the basic contract apply to all orders. Guidance for preparing R&D Status Reports (sequence 1) is contained in the Handbook, section 4. In addition, the sequence numbers and dates listed below are applicable to this order:

Sequence No.	Para No.	Block 10 (freq.)	Block 11 (as of date)	Block 12 (date of 1st. submit.)	Block 13 (date of final report)	Block 14 (no. of copies)
3 (NETWORK ANALYSIS)	1.1.4.1a	QTRLY	12APR93	30APR93	a	4
4 (WORK PLAN)	1.1.4.1b	ONE/R	12APR93	30MAY93	30JULY93	b
4 (WORK PLAN ADDENDUM)	1.1.4.1b	ONE/R		2WKSDOA	15SEPT94	m
4 (SAP)	1.1.1.4c	ONE/R	12APR93	30MAY93	30JULY93	b
4 (SAP ADDENDUM)	1.1.4.1c	ONE/R		3WKSDOA	15SEPT94	n
4 (HSP)	1.1.4.1d	OTIME	12APR93	30MAY93	-	10
4 (HSP ADDENDUM)	1.1.4.1d	OTIME		2WKSDOA		5
4 (COMM. REL. PLAN)	1.1.1.4e	ONE/R	12APR93	30MAY93	31DEC93	b
16 (SPECIAL NOTIF.)	1.1.4.2	OTIME	c	c	-	3
9 (PRESNT. MATERIAL)	1.1.4.3	ASREQ	d	d	-	10
18 (MTG. RPTS)	1.1.4.4	ONE/R	e	e	-	5
3 (NEWSLETTER)	1.1.4.5	QTRLY	12APR93	30NOV93	a	f
3 (FACT SHEETS)	1.1.4.6	ASREQ	12APR93	15JUL93	g	-
3 (PUBLIC NOTICES)	1.1.4.7	ASREQ	12APR93	15JUL93	g	h
9 (PHOTO NOTEBOOK)	1.1.4.8	OTIME	12APR93	15JUL93	-	1
3 (MAILING LIST)	1.1.4.9	QTRLY	12APR93	15JUL93	a	-
3 (MAPS)	1.1.4.10	OTIME	12APR93	15JUL93	-	2
4 INFO REPOS	1.1.4.11	OTIME	31JUL93	-	31JAN94	2
3 (IRPMS Data ITIR) (Data Management)	1.1.4.12	OTIME	31JUL93	31JAN94	31MAR94	2
BCHCON						
BCHLDI						
BCHSLI						
BCHWCI						
BCHSAMP						
BCHCALC						
BCHLTD						
BCHTEST						
BCHRES						
BCHGWD						
4 DECISION DOC	1.1.4.13	ONE/R	i	i	31OCT94	b
4 RI REPORT	1.1.4.14.1	ONE/R	15SEP93	15FEB94	30APR94	b
4 RISK ASSESSMENT	1.1.4.14.2	ONE/R	1OCT93	16MAY94	15JUL94	b
4 FEASIB. STUDY	1.1.4.14.3	ONE/R	30SEPT93	30AUG94	-	b
4 RI/FS Report	1.1.4.14.4	ONE/R	30SEP93	30SEP94	1JAN95	b
4 IRP DOCUMENT	1.14.15	ONE/R	31JUL93	31OCT93	10DEC93	b
3 ANALYTICAL DATA ITIR		OTIME		01DEC94		2
3 SCREENING ALTER ITIR	1.1.4.16a	OTIME	30SEP93	30DEC93	-	10
3 DETAL ANALYSIS ALTER ITIR	1..1.4.16.b	OTIME	28 FEB94	30MAR94	-	10
1 DPM SCORING	1.1.4.16c	OTIME	30SEP93	j	j	3
3 MYLAR MAP	1.1.4.16d	OTIME	k	k	-	5
3 GEOPHYS CONT	1.1.4.16.e	OTIME	l	l	-	10
3 SOIL GAS MAP	1.1.4.16f	OTIME	l	l	-	10
4 SCS ITIR	1.1.4.16g	ONE/R	:	01FEB95	01APR95	o
~~4 SCS ITIR~~	~~1.1.4.16g~~	~~ONE/R~~	~~15SEP93~~	~~30NOV93~~	~~15FEB94~~	5
4 WEEKLY ACT REP	1.1.4.16h	WEEKLY	13AUG93	13AUG93	-	1

6.2 Reserved.

6.3 Notes

a. Submit Quarterly Thereafter.

b. One (1) first draft plan (8 copies), one (1) second draft plan (8 copies), and one (1) final plan (10 copies) are required. Incorporate Air Force comments into the second draft and final plan as specified by the RTC. Supply AFCEE/ESR with an advance copy of the first draft, second draft, and final plan for acceptance prior to distribution. Distribute the remaining copies of each plan as specified by the RTC. The second and final reports shall be submitted within three (3) weeks of receipt of comments from the RTC.

c. Primary and Secondary Documents. One first draft report (25 copies), one second draft report (25 copies), and one final report (35 bound copies plus the original camera-ready copy and a 3.5 inch disk formatted in WordPerfect 5.1 containing the document file) are required. Incorporate Air Force comments into the second draft and final reports as specified by the RTC. Supply the RTC with an advance copy of the first draft, second draft, and final reports for acceptance prior to distribution. Distribute the remaining copies as specified by the RTC .

d. Provide written notice with supporting documentation within three (3) days of telephone notification and at the direction of the RTC. Assume a maximum of 100 pages.

e. Provide within one (1) week of task/meeting completion.

f. Provide 500 copies of the Newsletters and distribute as agreed to by the RTC. This includes mailing the final product to on-base personnel and addresses on the existing mailing list.

g. Provide draft and final deliverables. Provide two advance copies to the AFCEE RTC and to the 11 CEOS Community Relations Coordinator for acceptance prior to preparation of the final deliverables.

h. Provide poster-size map.

i. Submit with the second draft Technical Report.

j. Submit with the Technical Report.

k. Provide with the Technical Report.

l. Provide within four (4) weeks of task completion.

m. Both a draft and a final addendum to the existing work plan is required for the removal actions specified in paragraph I.1.3.14. Field removal activities performed at Cape Lisburne LRRS pursuant to paragraph I.1.3.14 of this SOW shall commence upon submittal of the draft work plan to AFCEE for review. The Contractor shall distribute both versions of the work plan as specified by AFCEE.

n. The SAP addendum shall focus on the sampling and analysis activities to be conducted under the removal actions specified in paragraph I.1.3.14 of this SOW. The Contractor shall incorporate any Government comments into the final project-specific SAP. The Contractor shall distribute the SAP as specified by AFCEE.

o. A Site Characterization Summary ITIR must be prepared based on the findings of sampling and analyses conducted pursuant to the removal action specified in paragraph I.1.3.14. The Contractor shall incorporate any Government comments into the final ITIR. The Contractor shall distribute the ITIR as specified by AFCEE.

~~**Notes:**~~

a ~~Unless an abbreviated list of analytes is specified under "Parameter" above, the analytical protocol shall include all analytes listed in the referenced analytical method. The methods cited are from the following sources:~~

~~"A" Methods — Standard Methods for the Examination of Water and Wastewater, 16th Edition (1985)~~

~~"E" Methods — Methods for Chemical Analysis of Water and Wastes, EPA Manual, 600/4-79-020 (USEPA, 1983--with additions)~~

~~"SW" Methods — Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Edition (USEPA, 1986)~~

~~"ASTM" Methods — American Society for Testing and Materials, 1919 Race Street, Philadelphia, PA 19103~~

b ~~The maximum number of second-column confirmation analyses shall not exceed fifty (50) percent of the actual number of field samples (to include duplicates, replicates, ambient, condition blanks, trip blanks, and equipment blanks). If the number of samples requiring second-column confirmation exceeds this allowance, contact the HSD Technical Project Manager. The total number of samples listed in Tables A-4 and A-5 includes the allowance applicable to each GC method. If GC/MS, or a combination of second-column GC and GC/MS, is used, the total cost of all such analyses for a particular parameter shall not exceed the funding allowed for positive confirmation using only second-column GC.~~

REF 68X 68X

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. PAGE 1 OF 3

2. PROC INSTRUMENT ID NO. (PIN)	3. SPIIN	4. EFFECTIVE DATE	5. REQUISITION/PURCHASE REQUEST PROJECT NO.	6. BCC/DMS RATING
F33615-90-D-4010	002205	20SEP94	FY7624-94-08822	

7. ISSUED BY CODE FA8900

DEPARTMENT OF THE AIR FORCE
AIR FORCE MATERIAL COMMAND
HUMAN SYSTEMS CENTER
BROOKS AFB TX 78235-5320

Buyer: EDWIN CUSTODIO HSC/PKVBC
Phone: (210)536-4493

8. ADMINISTERED BY (IF OTHER THAN BLOCK 7) CODE S2404A

DCMAO BALTIMORE
ATTN: CHESAPEAKE
200 TOWSONTOWN BLVD, WEST
TOWSON, MD 21204-5299

DUPLICATE ORIGINAL

9. CONTRACTOR NAME AND ADDRESS CODE 69148 FACILITY CODE

IF "Y" FOR MULTIPLE FACILITIES SEE SECT "K"

ICF TECHNOLOGY
9300 LEE HIGHWAY
FAIRFAX VA 22031-1207

PHONE:(703)934-3000
COUNTRY:FAIRFAX

MAIL DATE
SEP 23 1994

10. SECURITY CLAS U

11. DISCOUNT FOR PROMPT PAYMENT

1 ST % DAYS
2 ND % DAYS
3 RD % DAYS
NET DAYS
OTHER IF "9" SEE SECT "E"

12. PURCHASE OFFICE POINT OF CONTACT
MVH/M1E/MVH

13. THIS BLOCK APPLIES ONLY TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in block 17. The hour and date specified for receipt of Offers ☐ is extended ☐ is not extended

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation, or as amended by one of the following methods:

(a) By signing and returning ______ copies of this amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE ISSUING OFFICE PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

14. THIS BLOCK APPLIES ONLY TO MODIFICATION OF CONTRACTS

☐ THIS CHANGE IS ISSUED PURSUANT TO ______ THE CHANGES SET FORTH HEREIN ARE MADE TO THE ABOVED NUMBERED CONTRACT/ORDER.

☐ THE ABOVE NUMBERED CONTRACT IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (SUCH AS CHANGES IN PAYING OFFICE, APPROPRIATION DATA, ETC.) SET FORTH HEREIN.

☐ THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF ______ IT MODIFIES THE ABOVE NUMBERED CONTRACT AS SET FORTH HEREIN.

☒ THIS MODIFICATION IS ISSUED PURSUANT TO FAR 52.232-7 PAYMENT UNDER T&M OR LABOR HOURS

15. CONTRACT ADMINISTRATION DATA

A. KIND OF MOD	B. MOD ABST RECIPIENT ADP PT	C. DATE OF SIGNATURE MODIFICATION	D. CHANGE IN CONTRACT AMOUNT INCREASE (+) DECREASE (-)	E. LOSING PO/CAO ON TRANSFER	F. GAINING PO/CAO ON TRANSFER	G. SVC/AGENCY USE
C			$ SEE SECTION G			

16. ENTER ANY APPLICABLE CHANGES

A. PAY CODE	B. EFFECTIVE DATE OF AWARD	C. CONTRACT (1) TYPE (2) KIND	D. TYPE CONTR	E. SURV CRIT	F. SPL CONTR PROVISIONS	G. PAYING OFC CODE	H. DATE SIGNED	I. SECURITY (1) CLAS (2) DATE OF DD 254

17. REMARKS *(Except as provided herein, all items and conditions of the contract, as heretofore changed, remain unchanged and in full force and effect.)* SUBJECT: INCREASE CEILING AMOUNT/ FUND OVERRUN
PROJECT MANAGER: SAMER N. KARMI, AFCEE/ERDW, BROOKS AFB, TX 78235-5328
FINANCE OFFICE:(SC1030)DFAS-COLUMBUS CENTER, DFAS-CO/CHESAPEAKE DIV
COLUMBUS, OH 43218-2262

18. ☒ CONTRACTOR/OFFEROR IS NOT REQUIRED TO SIGN THIS DOCUMENT ☐ CONTRACTOR/OFFEROR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN ______ COPIES TO ISSUING OFFICE

19. CONTRACTOR/OFFEROR *(Signature of person authorized to sign)*
BY

22. UNITED STATES OF AMERICA *(Signature of Contracting Officer)*
BY

20. NAME AND TITLE OF SIGNER *(Type or print)*

21. DATE SIGNED

23. NAME OF CONTRACTING OFFICER *(Type or print)*
DEAN M. CARSELLO

24. DATE SIGNED
20 SEP 1994

AFMC FORM 702, JUL 92 REPLACES AFSC FORM 702, AUG 84 WHICH IS OBSOLETE

1. Pursuant to FAR 52.232-7 Payment Under Time-and-Material and Labor-Hours Contracts and in accordance with the provisions of the Basic Contract F33615-90-D-4010 and Delivery Order 0022, Mod. 05 the above delivery order is amended. The purpose of this modification is to increase the ceiling amount of this order by $330,000.00 to cover the total cost of the efforts being requested. The ceiling is being increased to cover existing work.

2. As a result of paragraph 1 above, said order is more specifically modified as follows:

a. SECTION A Cover Page: The ceiling amount in Block 20 (cover page) is increased by $330,000.00 from $3,528,878.00 to $3,858,878.00.

b. SECTION B Supplies/Services: is amended as set forth below.

Item No.	Supplies Schedule	Qty Purch Unit	Unit Price
0001	CLIN Change Sec Class: U Noun: Sampling, Analysis, and Data Acrn: XA nsn: N Sites Codes: pqa: D acp: D fob: D		N
0002	CLIN Change Sec Class: U Noun: Support Acrn: XA nsn: N Sites Codes: pqa: D acp: D fob: D		N
0004	CLIN Change Sec Class: U Noun: Chemical Analysis & Data Acrn: XA nsn: N Sites Codes: pqa: D acp: D fob: D		N

pr/mipr data: FY7624-94-08822

b. SECTION G Accounting Classification Data: is amended as set forth below:

ACRN	Acct Class Data	Appropriation/Lmt Subhead/CPN Recip DODAAD Supplemental Accounting Classification		Obligation Amount
AD	Account Establish			$330,000.00
	Unclassified	5743400	F74400	
		304 7434 434419 040000 53475 000000 674400		

pr/mipr data: FY7624-94-08822 (PR Complete)

descriptive data: AF Form 616 H94-SR-365 dated: 18 Aug 94 expiration: 22 Sep 94

XA Special ACRN Establish

descriptive data: Special ACRN XA Funds CLINs 0001, 0002, and 0004 and includes the following:

AA:	$ 299,855.00	(Basic DO)
AB:	99,986.00	(Mod. -01)
	2,899,511.00	(Mod. -02)
AC:	229,526.00	(Mod. -04)
AD:	330,000.00	(Mod. -05)
TOTAL	$3,858,878.00	

Finance Officer: Pay funds in alphabetical order.

3. Concurrence to this Unilateral Agreement is evidenced by contractor's (ICF) letter dated 8 Jun 94, incorporated herein by reference.

4. All other terms and conditions remain unchanged and in full force and effect.

REF 68X 68X

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. PAGE 1 OF 4

2. PROC INSTRUMENT ID NO. (PIIN)	3. SPIIN	4. EFFECTIVE DATE	5. REQUISITION/PURCHASE REQUEST PROJECT NO.	6. DOC/DMS RATING
F33615-90-D-4010	002206	27MAR95	FY7624-95-08452	DO-C9

7. ISSUED BY CODE FA8900
DEPARTMENT OF THE AIR FORCE
AIR FORCE MATERIEL COMMAND
HUMAN SYSTEMS CENTER
8005 9TH STREET
BROOKS AFB TX 78235-5353
Buyer: EDWIN CUSTODIO /PKVBA
Phone: (210) 536-4493

8. ADMINISTERED BY (IF OTHER THAN BLOCK 7) CODE S2404A
DCMAO BALTIMORE
ATTN: CHESAPEAKE
200 TOWSONTOWN BOULEVARD, WEST
TOWSON MD 21204-5299

9. CONTRACTOR NAME AND ADDRESS CODE 69418 FACILITY CODE
ICF TECHNOLOGY, INC.
9300 LEE HIGHWAY
FAIRFAX, VA 22301-3000

COUNTY: FAIRFAX
PHONE: (703)934-3000

IF "Y" FOR MULTIPLE FACILITIES SEE SECT "K"

ADVANCE COPY

10. SECURITY CLAS U

11. DISCOUNT FOR PROMPT PAYMENT
1ST % DAYS NET DAYS
2ND % DAYS OTHER IF "Y" SEE SECT "E"
3RD % DAYS

12. PURCHASE OFFICE POINT OF CONTACT
MVH/M1U/MVH

13. THIS BLOCK APPLIES ONLY TO AMENDMENTS OF SOLICITATIONS

[illegible]

14. THIS BLOCK APPLIES ONLY TO MODIFICATION OF CONTRACTS

☐ THIS CHANGE IS ISSUED PURSUANT TO
THE CHANGES SET FORTH HEREIN ARE MADE TO THE ABOVED NUMBERED CONTRACT/ORDER.

☐ THE ABOVE NUMBERED CONTRACT IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (SUCH AS CHANGES IN PAYING OFFICE, APPROPRIATION DATA, ETC.) SET FORTH HEREIN.

☐ THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF
IT MODIFIES THE ABOVE NUMBERED CONTRACT AS SET FORTH HEREIN.

☒ THIS MODIFICATION IS ISSUED PURSUANT TO IAW FAR 52.232-7 PAYMENT UNDER T&M AND LABOR HOURS

15. CONTRACT ADMINISTRATION DATA

A. KIND OF MOD	B. MOD ABST RECIPIENT ADP PT	C. DATE OF SIGNATURE MODIFICATION	D. CHANGE IN CONTRACT AMOUNT INCREASE (+) DECREASE (-)	E. LOSING PO/CAO ON TRANSFER	F. GAINING PO/CAO ON TRANSFER	G. SVC/AGENCY USE
B			$ SEE SECTION G			

16. ENTER ANY APPLICABLE CHANGES

A. PAY CODE	B. EFFECTIVE DATE OF AWARD	C. CONTRACT (1) TYPE (2) KIND	D. TYPE CONTR	E. SURV CRIT	F. SPL CONTR PROVISIONS	G. PAYING OFC CODE	H. DATE SIGNED	I. SECURITY (1) CLAS (2) DATE OF DD 254

17. REMARKS *(Except as provided herein, all items and conditions of the contract, as heretofore changed, remain unchanged and in full force and effect.)*
SUBJECT: INCREASE TO THE CONTRACT CEILING PRICE
PROJECT MANAGER: SAMER KARMI, AFCEE/ERD, BROOKS AFB TX 78235-5353
FINANCE OFFICE: (SC1030) DFAS-COLUMBUS CENTER, DFAS-CO/CHESAPEAKE DIV
P O BOX 182264, COLUMBUS OH 43218-2264

18. ☒ CONTRACTOR/OFFEROR IS NOT REQUIRED TO SIGN THIS DOCUMENT ☐ CONTRACTOR/OFFEROR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN ____ COPIES TO ISSUING OFFICE

19. CONTRACTOR/OFFEROR *(Signature of person authorized to sign)*
BY

22. UNITED STATES OF AMERICA *(Signature of Contracting Officer)*
BY Janelle J. Larrison

20. NAME AND TITLE OF SIGNER *(Type or print)*

21. DATE SIGNED

23. NAME OF CONTRACTING OFFICER *(Type or print)*
JANELLE J. LARRISON

24. DATE SIGNED
95 Mar 27

1. Pursuant to FAR 52.232-7 Payment Under Time-and-Material and Labor-Hours Contracts and in accordance with the provisions of the Basic Contract F33615-90-D-4010 and Delivery Order 0022, Mod. 06 the above delivery order is amended. The purpose of this modification is to increase the ceiling amount of this order by $315,000.00 to cover the total cost of the efforts being requested. The ceiling is being increased to cover existing work in the revised Work Plan.

2. As a result of paragraph 1 above, said order is more specifically modified as follows:

a. SECTION A Cover Page: The ceiling amount in Block 20 (cover page) is increased by $315.000.00 from $3,858,878.00 to $4,173,878.00.

b. SECTION B Supplies/Services: is amended as set forth below.

Item No.	Supplies Schedule	Qty Purch Unit	Unit Price
0001	CLIN Change Sec Class: U Noun: Sampling, Analysis, and Data Acrn: XA nsn: N Sites Codes: pqa: D acp: D fob: D		N
0002	CLIN Change Sec Class: U Noun: Support Acrn: XA nsn: N Sites Codes: pqa: D acp: D fob: D		N
0004	CLIN Change Sec Class: U Noun: Chemical Analysis & Data Acrn: XA nsn: N Sites Codes: pqa: D acp: D fob: D		N

pr/mipr data: FY76-95-08452

c. SECTION F Supplies schedule Data: The delivery schedule is modified as set forth below:

Item No.	Supplies Schedule Data		Delivery Quantity	Schedule Date
0001	CLIN Del Sch Change acrn: XA ship to: U	Sec Class: U	1	96 Jan 31
0002	CLIN Del Sch Change acrn: XA ship to: U	Sec Class: U	1	96 Jan 31
0004	CLIN Del Sch Change acrn: XA ship to: U	Sec Class: U	1	96 Jan 31

b. SECTION G Accounting Classification Data: is amended as set forth below:

ACRN	Acct Class Data	Appropriation/Lmt Subhead/CPN Supplemental Accounting Classification	Recip DODAAD	Obligation Amount
AE	Account Establish			$315,000.00
	Unclassified	5753400 305 7434 434419 040000 53440 000000 674400	F74400	

pr/mipr data: FY7624-95-08452 (PR Complete)

descriptive data: AF Form 616 H95-SR-298 dated: 1 Mar 95, expiration 15 Sep 95.

XA Special ACRN Establish

descriptive data: Special ACRN XA Funds CLINs 0001, 0002, and 0004 includes the following:

AA:	$ 299,855.00	(Basic DO)
AB:	99,986.00	(Mod.-01)
	2,899,511.00	(Mod.-02)
AC:	229,526.00	(Mod.-04)
AD:	330,000.00	(Mod.-05)
AE:	315,000.00	(Mod.-06)
	$4,173,878.00	

Finance Officer: Pay funds in alphabetical order.

3. Concurrence to this Unilateral Agreement is evidenced by contractor's (ICF) letter dated 18 Jan 95, incorporated herein by reference.

4. All other terms and conditions remain unchanged and in full force and effect.

APPENDIX D

SAMPLE COLLECTION LOGS

SAMPLE COLLECTION LOGS FOR THE DIESEL FUEL SPILL (SS01)

SAMPLE COLLECTION LOG

DATE: 8-27-93 SAMPLE ID: BRW-SS01-S01-2

RADAR STATION: Barrow WEATHER: Overcast, 45°F, fog, breezy

SITE/AOC: SS01, Diesel Fuel Spill FEET FROM FIXED POINT: 158 MAGNETIC HEADING: 143°

FIXED POINT: Southeast corner of shed in POL area.

SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: JP, RC

TIME SAMPLED: 13:15 DEPTH OF SAMPLE (feet): 2

SAMPLE DESCRIPTION/COMMENTS: Across road from module train, next to pipe. Brown-gray clayey silt, some gravel, some organics, very wet, firm.

SAMPLING METHOD: Hand auger

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

BG = 0	MONITORING READINGS				
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
13:20	97 ppm in BH				
	BG in BZ				
BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)					

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER		SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER		SOIL
TPH	✓	1 liter		8 oz	VOC (8260)	✓	3 x 40 ml		4 oz
PCB					SVOC (8270)	✓	1 liter		8 oz
PESTICIDES					TOTAL METALS		1 liter		8 oz
HVOC 8010		1 x 40 ml		4 oz	DISS METALS		1 liter		---
VOC-BTEX 8020	✓				TDS		250 ml		---
					TSS		250 ml		---
					TOC	✓	500 ml		4 oz
					TCLP		2 liters		2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 8-27-93 SAMPLE ID: BRW-SS01-S02-1.5

RADAR STATION: Barrow WEATHER: Overcast, fog, breezy, 45°F

SITE/AOC: SS01, Diesel Fuel Spill FEET FROM FIXED POINT: 195 MAGNETIC HEADING: 195°

FIXED POINT: Southeast corner of shed in POL area.

SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: JP, RC

TIME SAMPLED: 14:00 DEPTH OF SAMPLE (feet): 1.5

SAMPLE DESCRIPTION/COMMENTS: Across road from south end of module train. Brown clayey silt, firm, very wet, sample taken above permafrost.

SAMPLING METHOD: Hand auger

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

BG = 0	MONITORING READINGS				
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
14:05	BG in BH and BZ				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER		BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER		ANCHORAGE LAB CONTAINERS SOIL
TPH	✓	1 liter		8 oz	VOC (8260)		3 x 40 ml		4 oz
PCB					SVOC (8270)		1 liter		8 oz
PESTICIDES					TOTAL METALS		1 liter		8 oz
HVOC 8010		1 x 40 ml		4 oz	DISS METALS		1 liter		---
VOC-BTEX 8020	✓				TDS		250 ml		---
					TSS		250 ml		---
					TOC		500 ml		4 oz
					TCLP		2 liters		2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 8-27-93 SAMPLE ID: BRW-SS01-S03-2

RADAR STATION: Barrow WEATHER: Overcast, fog, breeze, 45°F

SITE/AOC: SS01, Diesel Fuel Spill FEET FROM FIXED POINT: 87 MAGNETIC HEADING: 172°

FIXED POINT: Southeast corner of shed in POL area.

SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: JP, RC

TIME SAMPLED: 14:20 DEPTH OF SAMPLE (feet): 2

SAMPLE DESCRIPTION/COMMENTS: In field across road from module train, south of POL area. Gray clayey silt, firm, some peat. Sample taken just above permafrost.

SAMPLING METHOD: Hand auger

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS

TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

BG = 0 **MONITORING READINGS**

TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
14:25	BG in BH				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010	✓	1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 9-6-93 SAMPLE ID: BRW-SS01-2S04-2

RADAR STATION: Barrow WEATHER: Overcast, sleet, windy (40+ mph)

SITE/AOC: SS01, Diesel Fuel Spill FEET FROM FIXED POINT: 20 MAGNETIC HEADING: 0° North

FIXED POINT: Along west side of west module train, 20' north of south end, in alcove.

SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: JP, RC

TIME SAMPLED: 13:45 DEPTH OF SAMPLE (feet): 2

SAMPLE DESCRIPTION/COMMENTS: Silty coarse sand, moist.

SAMPLING METHOD: Grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED							
		BARROW LAB				ANCHORAGE LAB	
ANALYSES	✓	CONTAINERS		ANALYSES	✓	CONTAINERS	
		WATER	SOIL			WATER	SOIL
TPH		1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020				TDS		250 ml	---
EPH	✓		8 oz	TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 9-6-93 SAMPLE ID: BRW-SS01-2S05-1

RADAR STATION: Barrow WEATHER: Overcast, windy (40+ mph), sleet

SITE/AOC: SS01, Diesel Fuel Spill FEET FROM FIXED POINT: 40 MAGNETIC HEADING: 90°

FIXED POINT: 40' north of south end of north module train along west side next to culvert under road.

SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: JP, AP

TIME SAMPLED: 13:50 DEPTH OF SAMPLE (feet): 1

SAMPLE DESCRIPTION/COMMENTS: Moist coarse silty sand

SAMPLING METHOD: Grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS

TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS

TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER		BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER		ANCHORAGE LAB CONTAINERS SOIL
TPH		1 liter		8 oz	VOC (8260)		3 x 40 ml		4 oz
PCB					SVOC (8270)		1 liter		8 oz
PESTICIDES					TOTAL METALS		1 liter		8 oz
HVOC 8010		1 x 40 ml		4 oz	DISS METALS		1 liter		---
VOC-BTEX 8020					TDS		250 ml		---
EPH	✓			8 oz	TSS		250 ml		---
					TOC		500 ml		4 oz
					TCLP		2 liters		2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 9-6-93 SAMPLE ID: BRW-SS01-2S06-2

RADAR STATION: Barrow WEATHER: Overcast, windy (40+ mph), sleet

SITE/AOC: SS01, Diesel Fuel Spill FEET FROM FIXED POINT: 75' MAGNETIC HEADING: 0° North

FIXED POINT: North side of north module train, 75' north of south end.

SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: AP, JP

TIME SAMPLED: 13:55 DEPTH OF SAMPLE (feet): 2

SAMPLE DESCRIPTION/COMMENTS: Moist silty sand, coarse grain.

SAMPLING METHOD: Grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED									
ANALYSES	✓	BARROW LAB CONTAINERS		ANALYSES	✓	ANCHORAGE LAB CONTAINERS			
		WATER	SOIL			WATER		SOIL	
TPH		1 liter	8 oz	VOC (8260)		3 x 40 ml		4 oz	
PCB				SVOC (8270)		1 liter		8 oz	
PESTICIDES				TOTAL METALS		1 liter		8 oz	
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter		---	
VOC-BTEX 8020				TDS		250 ml		---	
EPH	✓		8 oz	TSS		250 ml		---	
				TOC		500 ml		4 oz	
				TCLP		2 liters		2 x 8 oz	

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 9-6-93 SAMPLE ID: BRW-SS01-2S07-1

RADAR STATION: Barrow WEATHER: Overcast, sleet, windy (40+ mph)

SITE/AOC: SS01, Diesel Fuel Spill FEET FROM FIXED POINT: 45 MAGNETIC HEADING: 0° North

FIXED POINT: 5' east of east side of north module train, 45' north of south end of south module train, next to POL pipe.

SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: AP, JP

TIME SAMPLED: 14:00 DEPTH OF SAMPLE (feet): 1

SAMPLE DESCRIPTION/COMMENTS: Moist, silty, coarse sand.

SAMPLING METHOD: Grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS

TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS

TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH		1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
EPH	✓		8 oz	TSS		250 ml	---
VPH	✓		4 oz	TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 9-6-93 SAMPLE ID: BRW-SS01-2S08-2

RADAR STATION: Barrow WEATHER: Overcast, windy (40+ mph), sleet

SITE/AOC: SS01, Diesel Fuel Spill FEET FROM FIXED POINT: ______ MAGNETIC HEADING: ______

FIXED POINT: 2' south of south side of north module train, 36' north of south end of south module train, 10' south of ditch

SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: AP, JP

TIME SAMPLED: 14:10 DEPTH OF SAMPLE (feet): 2

SAMPLE DESCRIPTION/COMMENTS: Moist, coarse sand, trace silt

SAMPLING METHOD: Grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID ______

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID ______

WATER PARAMETERS

TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS

TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH		1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020				TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz
				EPH	✓		

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 9-6-93 SAMPLE ID: BRW-SS01-2S09-1

RADAR STATION: Barrow WEATHER: Overcast, windy (40+ mph)

SITE/AOC: SS01, Diesel Fuel Spill FEET FROM FIXED POINT: ______ MAGNETIC HEADING: ______

FIXED POINT: 15' NW of north side of south module train, 1' N of POL pipe, 5' N of ditch.

SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: AP, JP

TIME SAMPLED: 14:20 DEPTH OF SAMPLE (feet): 1

SAMPLE DESCRIPTION/COMMENTS: Moist, silty sand, coarse grained.

SAMPLING METHOD: Grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID ______

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID ______

WATER PARAMETERS

TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS

TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER		BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER		ANCHORAGE LAB CONTAINERS SOIL
TPH		1 liter		8 oz	VOC (8260)		3 x 40 ml		4 oz
PCB					SVOC (8270)		1 liter		8 oz
PESTICIDES					TOTAL METALS		1 liter		8 oz
HVOC 8010		1 x 40 ml		4 oz	DISS METALS		1 liter		---
VOC-BTEX 8020					TDS		250 ml		---
					TSS		250 ml		---
					TOC		500 ml		4 oz
					TCLP		2 liters		2 x 8 oz
					EPH	✓			

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 9-6-93 SAMPLE ID: BRW-SS01-2S10-5
RADAR STATION: Barrow WEATHER: Overcast, sleet, windy (40+ mph)
SITE/AOC: SS01, Diesel Fuel Spill FEET FROM FIXED POINT: 5 MAGNETIC HEADING: ~90°
FIXED POINT: Under south module train, 1 foot from south end, 5 feet from east side.
SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)
SAMPLERS: AP, JP
TIME SAMPLED: 14:25 DEPTH OF SAMPLE (feet): 5
SAMPLE DESCRIPTION/COMMENTS: Moist silty sand, coarse grain

SAMPLING METHOD: Grab
QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes
☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID
☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS

TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS

TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH		1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020				TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz
				EPH	✓		

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C
Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)
Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 9-6-93 SAMPLE ID: BRW-SS01-2S11-.5

RADAR STATION: Barrow WEATHER: Overcast, windy (40+ mph), sleet

SITE/AOC: SS01, Diesel Fuel Spill FEET FROM FIXED POINT: 35° MAGNETIC HEADING: 120°

FIXED POINT: 48' southeast of east side of north train, 35' east of south end of module train.

SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: AP, SF

TIME SAMPLED: 14:35 DEPTH OF SAMPLE (feet): 0.5

SAMPLE DESCRIPTION/COMMENTS: Moist, coarse, silty sand.

SAMPLING METHOD: Grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)					

✓ CHECK ANALYSES REQUESTED							
		BARROW LAB				ANCHORAGE LAB	
ANALYSES	✓	CONTAINERS		ANALYSES	✓	CONTAINERS	
		WATER	SOIL			WATER	SOIL
TPH		1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020				TDS		250 ml	---
EPH	✓			TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 9-6-93 SAMPLE ID: BRW-SS01-2S12-.25

RADAR STATION: Barrow WEATHER: Overcast, windy, (40+ mph), sleet

SITE/AOC: SS01, Diesel Fuel Spill FEET FROM FIXED POINT: 35 MAGNETIC HEADING: 226°

FIXED POINT: 35 feet west of west side of north module train, 226° from west corner of module train.

SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: AP, JP

TIME SAMPLED: 14:30 DEPTH OF SAMPLE (feet): 0.25

SAMPLE DESCRIPTION/COMMENTS: Wet, silty, coarse sand.

SAMPLING METHOD: Grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED							
ANALYSES	✓	BARROW LAB CONTAINERS		ANALYSES	✓	ANCHORAGE LAB CONTAINERS	
		WATER	SOIL			WATER	SOIL
TPH		1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020				TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz
				EPH	✓		

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 8-27-93 SAMPLE ID: BRW-SS01-SD01

RADAR STATION: Barrow WEATHER: Overcast, breezy, 45°F, foggy

SITE/AOC: SS01, Diesel Fuel Spill FEET FROM FIXED POINT: 158 MAGNETIC HEADING: 152°

FIXED POINT: Southeast corner of shed in POL area.

SAMPLE MATRIX: ☐ Soil (S) ■ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: JP, RC

TIME SAMPLED: 13:20 DEPTH OF SAMPLE (feet): 0 - 0.5

SAMPLE DESCRIPTION/COMMENTS: Across from module train, in puddle next to road. Same location as SS01-SW01.

SAMPLING METHOD:

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

BG = 0	MONITORING READINGS				
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
13:30	5 in S				
	BG in BZ				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH	✓	1 liter	8 oz	VOC (8260)	✓	3 x 40 ml	4 oz
PCB				SVOC (8270)	✓	1 liter	8 oz
PESTICIDES	✓			TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 8-27-93 SAMPLE ID: BRW-SS01-SD02

RADAR STATION: Barrow WEATHER: Overcast, foggy, 45°F, breezy

SITE/AOC: SS01, Diesel Fuel Spill FEET FROM FIXED POINT: 158 MAGNETIC HEADING: 166.5°

FIXED POINT: Southeast corner of shed in POL area

SAMPLE MATRIX: ☐ Soil (S) ■ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: JP, RC

TIME SAMPLED: 14:50 DEPTH OF SAMPLE (feet): 0 to 0.5

SAMPLE DESCRIPTION/COMMENTS: In seep west of road by module train, south of POL area. Black silty sand, fine to coarse sand, saturated, sheen.

SAMPLING METHOD:

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

BG = 0	MONITORING READINGS				
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
14:50	BG in S				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED							
ANALYSES	✓	BARROW LAB CONTAINERS		ANALYSES	✓	ANCHORAGE LAB CONTAINERS	
		WATER	SOIL			WATER	SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 8-27-93 SAMPLE ID: BRW-SS01-SD03

RADAR STATION: Barrow WEATHER: Overcast, 45°F, foggy, breezy

SITE/AOC: SS01, Diesel Fuel Spill FEET FROM FIXED POINT: 150 MAGNETIC HEADING: 184°

FIXED POINT: Southeast corner of shed in POL area.

SAMPLE MATRIX: ☐ Soil (S) ■ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: JP, RC

TIME SAMPLED: 15:05 DEPTH OF SAMPLE (feet): 0.5

SAMPLE DESCRIPTION/COMMENTS: Across road from south end of module train, same location as SS01-SW02. Gray, clayey silt, some gravel, trace organics, saturated.

SAMPLING METHOD:

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

BG = 0	MONITORING READINGS				
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
15:03	BG on S				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED							
		BARROW LAB				ANCHORAGE LAB	
ANALYSES	✓	CONTAINERS		ANALYSES	✓	CONTAINERS	
		WATER	SOIL			WATER	SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 8-27-93 SAMPLE ID: BRW-SS01-SD04
RADAR STATION: Barrow WEATHER: Overcast, breezy, 45°F, foggy
SITE/AOC: SS01, Diesel Fuel Spill FEET FROM FIXED POINT: 53 MAGNETIC HEADING: 258°
FIXED POINT: Southwest corner of shed in POL area.
SAMPLE MATRIX: ☐ Soil (S) ■ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)
SAMPLERS: RC, JP
TIME SAMPLED: 15:40 DEPTH OF SAMPLE (feet): 0.5
SAMPLE DESCRIPTION/COMMENTS: West of road to shed in POL area. Same location as SS01-SW03. Black silty sand, saturated, sheen, no odor, coarse sand.
SAMPLING METHOD:
QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes
☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID
☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

BG = 0 MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
15:38	BG off sample				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C
Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)
Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 8-27-93 SAMPLE ID: BRW-SS01-SD05
RADAR STATION: Barrow WEATHER: Overcast, foggy, breezy, 45°F
SITE/AOC: SS01, Diesel Fuel spill FEET FROM FIXED POINT: 56 MAGNETIC HEADING: 161°
FIXED POINT: Southeast corner of shed in POL area.
SAMPLE MATRIX: ☐ Soil (S) ■ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)
SAMPLERS: RC, JP
TIME SAMPLED: 15:20 DEPTH OF SAMPLE (feet): 0.5
SAMPLE DESCRIPTION/COMMENTS: Next to POL line, east of road to shed in POL area. SS01-SD09 is a replicate, same location as SS01-SW04. Black silty sand, coarse grained, saturated.
SAMPLING METHOD:
QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes
☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID
☐ Ambient Condition Blank (AB) ■ Replicate of Soil Sample ID SS01-SD09

WATER PARAMETERS

TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

BG = 0 MONITORING READINGS

TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
15:15	BG on S				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C
Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)
Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 8-27-93 SAMPLE ID: BRW-SS01-SD06

RADAR STATION: Barrow WEATHER: Overcast, 45°F, breezy, foggy

SITE/AOC: SS01, Diesel Fuel Spill FEET FROM FIXED POINT: 189 MAGNETIC HEADING: 2°

FIXED POINT: Southwest corner of shed in POL area.

SAMPLE MATRIX: ☐ Soil (S) ■ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: JP, RC

TIME SAMPLED: 15:45 DEPTH OF SAMPLE (feet): 0.5

SAMPLE DESCRIPTION/COMMENTS: Northwest of POL tanks, close to lagoon. Same location as SS01-SW05. Black silty sand, saturated, medium to coarse grained.

SAMPLING METHOD:

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

BG = 0	MONITORING READINGS				
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
15:45	BG in S				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED							
ANALYSES	✓	BARROW LAB CONTAINERS		ANALYSES	✓	ANCHORAGE LAB CONTAINERS	
		WATER	SOIL			WATER	SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 8-27-93 SAMPLE ID: BRW-SS01-SD07

RADAR STATION: Barrow WEATHER: Overcast, breezy, 45°F, foggy

SITE/AOC: SS01, Diesel Fuel Spill FEET FROM FIXED POINT: 240 MAGNETIC HEADING: 329°

FIXED POINT: Southwest corner of shed in POL area.

SAMPLE MATRIX: ☐ Soil (S) ■ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: JP, RC

TIME SAMPLED: 16:00 DEPTH OF SAMPLE (feet): 0.5

SAMPLE DESCRIPTION/COMMENTS: Northwest of POL tanks, close to lagoon. Same location as SS01-SW06. Black silty sand, saturated, some gravel, some organics.

SAMPLING METHOD:

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

BG = 0	MONITORING READINGS				
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
16:04	BG in S				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED							
ANALYSES	✓	BARROW LAB CONTAINERS		ANALYSES	✓	ANCHORAGE LAB CONTAINERS	
		WATER	SOIL			WATER	SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 8-27-93 SAMPLE ID: BRW-SS01-SD08

RADAR STATION: Barrow WEATHER: Overcast, breezy, foggy, 50°F

SITE/AOC: SS01, Diesel Fuel Spill FEET FROM FIXED POINT: 80 MAGNETIC HEADING: 6°

FIXED POINT: Door to module train.

SAMPLE MATRIX: ☐ Soil (S) ■ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: JP, RC

TIME SAMPLED: 16:15 DEPTH OF SAMPLE (feet): 0.5

SAMPLE DESCRIPTION/COMMENTS: North of POL area across road from module train. Same location as SS01-SW07. Brown silty sand, trace organics, coarse sand.

SAMPLING METHOD:

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

BG = 0	MONITORING READINGS				
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
16:20	BG on sample				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED							
ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 8-27-93 SAMPLE ID: BRW-SS01-SD09

RADAR STATION: Barrow WEATHER: Overcast, foggy, 45°F, breezy

SITE/AOC: SS01, Diesel Fuel Spill FEET FROM FIXED POINT: 56 MAGNETIC HEADING: 161°

FIXED POINT: Southeast corner of shed in POL area.

SAMPLE MATRIX: ☐ Soil (S) ■ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: JP, RC

TIME SAMPLED: 15:20 DEPTH OF SAMPLE (feet): 0.5

SAMPLE DESCRIPTION/COMMENTS: Next to POL line, east of road to shed in POL area. Black silty sand, coarse grained sand.

SAMPLING METHOD:

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ■ Replicate of Soil Sample ID BRW-SS01-SD05

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

BG = 0	MONITORING READINGS				
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
15:29	BG on S				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 8-27-93 SAMPLE ID: BRW-SS01-SW01

RADAR STATION: Barrow WEATHER: Foggy, 50°F

SITE/AOC: SS01, Diesel Fuel Spill FEET FROM FIXED POINT: 158 MAGNETIC HEADING: 152°

FIXED POINT: Southeast corner of shed in POL area

SAMPLE MATRIX: ☐ Soil (S) ☐ Sediment (SD) ■ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: AP, DN

TIME SAMPLED: 13:15 DEPTH OF SAMPLE (feet):

SAMPLE DESCRIPTION/COMMENTS: In puddle across road from module train, south of POL area. Same location as SS01-SD01.

SAMPLING METHOD: Grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY
13:15	6.7	870 µS	13°C		

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)					

✓ CHECK ANALYSES REQUESTED							
ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH	✓	1 liter	8 oz	VOC (8260)	✓	3 x 40 ml	4 oz
PCB				SVOC (8270)	✓	1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS	✓	250 ml	---
				TSS	✓	250 ml	---
				TOC	✓	500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 8-27-93 SAMPLE ID: BRW-SS01-SW02

RADAR STATION: Barrow WEATHER: Foggy, 50°F

SITE/AOC: SS01, Diesel Fuel Spill FEET FROM FIXED POINT: 150 MAGNETIC HEADING: 184°

FIXED POINT: Southeast corner of shed in POL area.

SAMPLE MATRIX: ☐ Soil (S) ☐ Sediment (SD) ■ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: AP, DN

TIME SAMPLED: 13:25 DEPTH OF SAMPLE (feet):

SAMPLE DESCRIPTION/COMMENTS: Across road from south end of module train. Same location as SS01-SD03.

SAMPLING METHOD: Grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ■ Duplicate of Water Sample ID SS01-SW08

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY
13:25	7.4	910 μS	9°C		

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)					

✓ CHECK ANALYSES REQUESTED							
ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

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SAMPLE COLLECTION LOG

DATE: 8-27-93 SAMPLE ID: BRW-SS01-SW03

RADAR STATION: Barrow WEATHER: Foggy, 50°F

SITE/AOC: SS01, Diesel Fuel Spill FEET FROM FIXED POINT: 53 MAGNETIC HEADING: 258°

FIXED POINT: Southwest corner of shed.

SAMPLE MATRIX: ☐ Soil (S) ☐ Sediment (SD) ■ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: AP, DN

TIME SAMPLED: 13:35 DEPTH OF SAMPLE (feet):

SAMPLE DESCRIPTION/COMMENTS: West of road to shed in POL area. Same location as SS01-SD04. Diesel odor in air.

SAMPLING METHOD: Grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY
13:35	7.3	1,010 µS	4°C		

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED							
ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 8-27-93 SAMPLE ID: BRW-SS01-SW04

RADAR STATION: Barrow WEATHER: Foggy, 50°F

SITE/AOC: SS01, Diesel Fuel Spill FEET FROM FIXED POINT: 56 MAGNETIC HEADING: 161°

FIXED POINT: Southeast corner of shed in POL area.

SAMPLE MATRIX: ☐ Soil (S) ☐ Sediment (SD) ■ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: AP, DN

TIME SAMPLED: 13:45 DEPTH OF SAMPLE (feet):

SAMPLE DESCRIPTION/COMMENTS: East of road to shed in POL area. South of POL area, next to POL pipeline. Same location as SS01-SD05.

SAMPLING METHOD: Grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY
13:45	7.6	1,450 μ S	7°C		

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)					

✓ CHECK ANALYSES REQUESTED							
ANALYSES	✓	BARROW LAB CONTAINERS		ANALYSES	✓	ANCHORAGE LAB CONTAINERS	
		WATER	SOIL			WATER	SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

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SAMPLE COLLECTION LOG

DATE: 8-27-93 SAMPLE ID: BRW-SS01-SW05

RADAR STATION: Barrow WEATHER: Foggy, 50°F

SITE/AOC: SS01, Diesel Fuel Spill FEET FROM FIXED POINT: 189 MAGNETIC HEADING: 2°

FIXED POINT: Southwest corner of shed in POL area.

SAMPLE MATRIX: ☐ Soil (S) ☐ Sediment (SD) ■ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: AP, DN

TIME SAMPLED: 13:55 DEPTH OF SAMPLE (feet):

SAMPLE DESCRIPTION/COMMENTS: Northwest of POL area, close to lagoon. Same location as SS01-SD06.

SAMPLING METHOD: Grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS

TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY
13:55	7.2	1,450 μS	7°C		

MONITORING READINGS

TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 8-27-93 SAMPLE ID: BRW-SS01-SW06

RADAR STATION: Barrow WEATHER: Foggy, 50°F

SITE/AOC: SS01, Diesel Fuel Spill FEET FROM FIXED POINT: 240 MAGNETIC HEADING: 329°

FIXED POINT: Southwest corner of shed in POL area.

SAMPLE MATRIX: ☐ Soil (S) ☐ Sediment (SD) ■ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: AP, DN

TIME SAMPLED: 14:00 DEPTH OF SAMPLE (feet):

SAMPLE DESCRIPTION/COMMENTS: Northwest of POL tanks, close to lagoon. Same location as SS01-SD07.

SAMPLING METHOD: Grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY
14:00	7.0	Off scale	7°C		

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)					

✓ CHECK ANALYSES REQUESTED							
		BARROW LAB				ANCHORAGE LAB	
ANALYSES	✓	CONTAINERS		ANALYSES	✓	CONTAINERS	
		WATER	SOIL			WATER	SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

ALASKA\4109641303\SS01SW06.LOG

SAMPLE COLLECTION LOG

DATE: 8-27-93 SAMPLE ID: BRW-SS01-SW07

RADAR STATION: Barrow WEATHER: Foggy, 50°F

SITE/AOC: SS01, Diesel Fuel Spill FEET FROM FIXED POINT: 80 MAGNETIC HEADING: 6°

FIXED POINT: Door to module train.

SAMPLE MATRIX: ☐ Soil (S) ☐ Sediment (SD) ■ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: AP, DN

TIME SAMPLED: 14:10 DEPTH OF SAMPLE (feet):

SAMPLE DESCRIPTION/COMMENTS: North of POL area, across road from module train. Same location as SS01-SD08.

SAMPLING METHOD: Grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY
14:10	7.3	1,640 μS	7°C		

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED									
ANALYSES	✓	BARROW LAB CONTAINERS			ANALYSES	✓	ANCHORAGE LAB CONTAINERS		
		WATER		SOIL			WATER		SOIL
TPH	✓	1 liter		8 oz	VOC (8260)		3 x 40 ml		4 oz
PCB					SVOC (8270)		1 liter		8 oz
PESTICIDES					TOTAL METALS		1 liter		8 oz
HVOC 8010		1 x 40 ml		4 oz	DISS METALS		1 liter		---
VOC-BTEX 8020	✓				TDS		250 ml		---
					TSS		250 ml		---
					TOC		500 ml		4 oz
					TCLP		2 liters		2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

ALASKA\4109841303\SS01SW07.LOG

SAMPLE COLLECTION LOG

DATE: 8-27-93 SAMPLE ID: BRW-SS01-SW08

RADAR STATION: Barrow WEATHER: Foggy, 50°F

SITE/AOC: SS01, Diesel Fuel Spill FEET FROM FIXED POINT: 150 MAGNETIC HEADING: 184°

FIXED POINT: Southeast corner of shed in POL area.

SAMPLE MATRIX: ☐ Soil (S) ☐ Sediment (SD) ■ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: AP, DN

TIME SAMPLED: 13:25 (13:30 on bottles) DEPTH OF SAMPLE (feet):

SAMPLE DESCRIPTION/COMMENTS: Across road from south end of module train. Same location as SS01-SW02

SAMPLING METHOD:

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ■ Duplicate of Water Sample ID BRW-SS01-SW02

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED							
		BARROW LAB				ANCHORAGE LAB	
ANALYSES	✓	CONTAINERS		ANALYSES	✓	CONTAINERS	
		WATER	SOIL			WATER	SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOGS FOR THE GARAGE (SS02)

SAMPLE COLLECTION LOG

DATE: 8-27-93 SAMPLE ID: BRW-SS02-S01-1.5

RADAR STATION: Barrow WEATHER: Overcast, foggy

SITE/AOC: SS02, Garage FEET FROM FIXED POINT: Southeast corner MAGNETIC HEADING: 90°

FIXED POINT: 1 foot north east of garage, 12 feet north of southeast corner.

SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: AP, DN

TIME SAMPLED: 16:00 DEPTH OF SAMPLE (feet): 1.5

SAMPLE DESCRIPTION/COMMENTS: Strong creosote smell in area. BKGD = 4 to 7 ppm. Brown rag at 6". Peat at 6". No visible staining. Just above water table. Sampled at interval with highest PID readings.

SAMPLING METHOD:

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
16:00	148 BH				
16:00	20 S				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER		SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER		SOIL
TPH	✓	1 liter		8 oz	VOC (8260)		3 x 40 ml		4 oz
PCB	✓				SVOC (8270)		1 liter		8 oz
PESTICIDES	✓				TOTAL METALS		1 liter		8 oz
HVOC 8010	✓	1 x 40 ml		4 oz	DISS METALS		1 liter		---
VOC-BTEX 8020	✓				TDS		250 ml		---
					TSS		250 ml		---
					TOC		500 ml		4 oz
					TCLP		2 liters		2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 8-27-93 SAMPLE ID: BRW-SS02-S02

RADAR STATION: Barrow WEATHER: Foggy, 50°F

SITE/AOC: SS02, Garage FEET FROM FIXED POINT: 8 MAGNETIC HEADING: 180° South

FIXED POINT: Under garage, 8 feet from south end, 1 foot from east end. Below floor drain.

SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: AP, DN

TIME SAMPLED: 14:30 DEPTH OF SAMPLE (feet): 2 inches

SAMPLE DESCRIPTION/COMMENTS: Below floor drain.

SAMPLING METHOD: Grab, soil scoop

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
14:30	0 BH				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED									
ANALYSES	✓	BARROW LAB CONTAINERS			ANALYSES	✓	ANCHORAGE LAB CONTAINERS		
		WATER		SOIL			WATER		SOIL
TPH	✓	1 liter		8 oz	VOC (8260)	✓	3 x 40 ml		4 oz
PCB	✓				SVOC (8270)	✓	1 liter		8 oz
PESTICIDES					TOTAL METALS	✓	1 liter		8 oz
HVOC 8010	✓	1 x 40 ml		4 oz	DISS METALS		1 liter		---
VOC-BTEX 8020	✓				TDS		250 ml		---
					TSS		250 ml		---
					TOC		500 ml		4 oz
					TCLP		2 liters		2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 8-27-93 SAMPLE ID: BRW-SS02-S03
RADAR STATION: Barrow WEATHER: Foggy, 50°F
SITE/AOC: SS02 Garage FEET FROM FIXED POINT: 8 MAGNETIC HEADING: 180° South
FIXED POINT: Under garage, 8 feet from south end, 10 feet from east end, below floor drain.
SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)
SAMPLERS: AP, DN
TIME SAMPLED: 14:40 DEPTH OF SAMPLE (feet): 1
SAMPLE DESCRIPTION/COMMENTS: Sandy gravel, dark grey, moist. Sampled just above tight clay. Hole terminated at this depth. B/C of high PID readings in breathing zone.
SAMPLING METHOD: Shovel, grab
QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes
☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID
☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

1 ppm Background	MONITORING READINGS				
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
14:40	84 BH				
BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)					

✓ CHECK ANALYSES REQUESTED							
ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB	✓			SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010	✓	1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C
Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)
Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

ALASKA\4109641303\SS02-S03.LOG

SAMPLE COLLECTION LOG

DATE: 8-27-93 SAMPLE ID: BRW-SS02-S04-.75

RADAR STATION: Barrow WEATHER: Foggy, 50°F

SITE/AOC: SS02, Garage FEET FROM FIXED POINT: 23 MAGNETIC HEADING: Southwest 325°

FIXED POINT: 15 feet southwest of garage, 15 feet in from south side

SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: AP, DN

TIME SAMPLED: 15:15 DEPTH OF SAMPLE (feet): 4 to 8 inches

SAMPLE DESCRIPTION/COMMENTS: Gravelly sand (SW) sand, gravel to 1/6". Loose, gray, moist, hard packed sand, gravel, and clayey material at top of borehole. Collected just above water table.

SAMPLING METHOD: Hand auger, grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
15:15	3 BH				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB	✓			SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010	✓	1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 8-27-93 SAMPLE ID: BRW-SS02-S05

RADAR STATION: Barrow WEATHER: Foggy 50° F

SITE/AOC: SS02, Garage FEET FROM FIXED POINT: 23 MAGNETIC HEADING: Southeast 325°

FIXED POINT: 15 feet southwest of garage, 15 feet in from south side

SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: SS, RC

TIME SAMPLED: 14:15 (14:20 on bottles) DEPTH OF SAMPLE (feet):

SAMPLE DESCRIPTION/COMMENTS: Gravelly sand (SW) sand, gravel to 1/6". Loose, gray, moist, hard packed sand, gravel, and clayey material at top of borehole. Collected just above water table.

SAMPLING METHOD:

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ■ Replicate of Soil Sample ID SS02-S04

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB	✓			SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010	✓	1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 9-6-93 SAMPLE ID: BRW-SS02-2S06-2
RADAR STATION: Barrow WEATHER: Windy, (40+ mph), overcast, sleet
SITE/AOC: SS02, Garage FEET FROM FIXED POINT: 55 MAGNETIC HEADING: 2°
FIXED POINT: Across road from northeast side of garage, 48 feet northeast, 18 feet along north side of garage
SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)
SAMPLERS: SS, JD
TIME SAMPLED: 13:15 DEPTH OF SAMPLE (feet): 2
SAMPLE DESCRIPTION/COMMENTS: Wet, silty sand, coarse grain

SAMPLING METHOD: Hand auger
QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes
☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID
☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED							
ANALYSES	✓	BARROW LAB CONTAINERS		ANALYSES	✓	ANCHORAGE LAB CONTAINERS	
		WATER	SOIL			WATER	SOIL
TPH		1 liter	8 oz	VOC (8260)	✓	3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020				TDS		250 ml	---
EPH	✓	1 liter	8 oz	TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz
				VPH	✓	3 x 40 ml	4 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C
Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)
Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 8-27-93 SAMPLE ID: BRW-SS02-SD01

RADAR STATION: Barrow WEATHER: Overcast, breezy, 45°F, foggy

SITE/AOC: SS02, Garage FEET FROM FIXED POINT: 57 MAGNETIC HEADING: 270°

FIXED POINT: 57 feet southwest of center of garage.

SAMPLE MATRIX: ☐ Soil (S) ■ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: AP, DN

TIME SAMPLED: 14:55 DEPTH OF SAMPLE (feet): 0.5

SAMPLE DESCRIPTION/COMMENTS: Organic muck. Brown plant fragments.

SAMPLING METHOD: Soil scoop - grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS

TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS

TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
14:55	0 S				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER		BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER		ANCHORAGE LAB CONTAINERS SOIL
TPH	✓	1 liter		8 oz	VOC (8260)		3 x 40 ml		4 oz
PCB	✓				SVOC (8270)		1 liter		8 oz
PESTICIDES	✓				TOTAL METALS		1 liter		8 oz
HVOC 8010	✓	1 x 40 ml		4 oz	DISS METALS		1 liter		---
VOC-BTEX 8020	✓				TDS		250 ml		---
					TSS		250 ml		---
					TOC		500 ml		4 oz
					TCLP		2 liters		2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOGS FOR THE AIR TERMINAL AREA (SS03)

SAMPLE COLLECTION LOG

DATE: 08/27/93 SAMPLE ID: BRW-SS03-S01-3.5

RADAR STATION: Barrow WEATHER: Overcast, fog, breezy, 50°F

SITE/AOC: SS03, Air Terminal Building FEET FROM FIXED POINT: 265 MAGNETIC HEADING: 83°

FIXED POINT: Southeast corner of ATV building.

SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: JP, RC

TIME SAMPLED: 11:00 DEPTH OF SAMPLE (feet): 3.5

SAMPLE DESCRIPTION/COMMENTS: East of hangar. Brown to dark brown, coarse sand, saturated, loose.

SAMPLING METHOD: Hand auger

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

BG=0	MONITORING READINGS				
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
10:54	BG in BZ				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED							
ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010	✓	1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

ALASKA\4109641303\SS03-S01

SAMPLE COLLECTION LOG

DATE: 08/27/93 SAMPLE ID: BRW-SS03-S02-3

RADAR STATION: Barrow WEATHER: Overcast, fog, breezy, 45°F

SITE/AOC: SS03, Air Terminal Building FEET FROM FIXED POINT: 105 MAGNETIC HEADING: 128°

FIXED POINT: Southeast corner of hangar.

SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: JP, RC

TIME SAMPLED: 11:20 DEPTH OF SAMPLE (feet): 3

SAMPLE DESCRIPTION/COMMENTS: South of hangar. Silty sand, coarse grained sand, saturated.

SAMPLING METHOD: Hand auger

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

BG=0	MONITORING READINGS				
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
11:18	BG in BH				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED										
ANALYSES	✓	BARROW LAB CONTAINERS			ANALYSES	✓	ANCHORAGE LAB CONTAINERS			
		WATER		SOIL			WATER		SOIL	
TPH	✓	1 liter		8 oz	VOC (8260)		3 x 40 ml		4 oz	
PCB					SVOC (8270)		1 liter		8 oz	
PESTICIDES					TOTAL METALS		1 liter		8 oz	
HVOC 8010	✓	1 x 40 ml		4 oz	DISS METALS		1 liter		---	
VOC-BTEX 8020	✓				TDS		250 ml		---	
					TSS		250 ml		---	
					TOC		500 ml		4 oz	
					TCLP		2 liters		2 x 8 oz	

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 08/27/93 SAMPLE ID: BRW-SS03-S03-2

RADAR STATION: Barrow WEATHER: Overcast, fog, breezy, 45°F

SITE/AOC: SS03, Air Terminal Building FEET FROM FIXED POINT: 160 MAGNETIC HEADING: 35°

FIXED POINT: North corner of hangar.

SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: JP, RC

TIME SAMPLED: 11:40 DEPTH OF SAMPLE (feet): 2

SAMPLE DESCRIPTION/COMMENTS: North of hangar. Silty sand, saturated, loose. Sample taken at permafrost.

SAMPLING METHOD: Hand auger

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

BG=0	MONITORING READINGS				
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
11:41	BG in BZ				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED							
		BARROW LAB				ANCHORAGE LAB	
ANALYSES	✓	CONTAINERS		ANALYSES	✓	CONTAINERS	
		WATER	SOIL			WATER	SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010	✓	1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 08/27/93 SAMPLE ID: BRW-SS03-S04-4

RADAR STATION: Barrow WEATHER: Foggy, 55°F

SITE/AOC: SS03, Air Terminal Building FEET FROM FIXED POINT: 75 MAGNETIC HEADING: 297.5°

FIXED POINT: Northwest corner of hangar.

SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: AP, DN

TIME SAMPLED: 11:35 DEPTH OF SAMPLE (feet): 4

SAMPLE DESCRIPTION/COMMENTS: North of hangar. Fine to coarse sand, gravel to 1/4 inch, loose, damp, medium brown. Sampled just over permafrost.

SAMPLING METHOD:

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS

TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS

TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
11:35	8 S				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH	✓	1 liter	8 oz	VOC (8260)	✓	3 x 40 ml	4 oz
PCB				SVOC (8270)	✓	1 liter	8 oz
PESTICIDES				TOTAL METALS	✓	1 liter	8 oz
HVOC 8010	✓	1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC	✓	500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 08/27/93 SAMPLE ID: BRW-SS03-S05-4

RADAR STATION: Barrow WEATHER: Foggy, 50°F

SITE/AOC: SS03, Air Terminal Building FEET FROM FIXED POINT: 126 MAGNETIC HEADING: 322°

FIXED POINT: Northwest of corner of hangar.

SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: AP, DN

TIME SAMPLED: 11:00 DEPTH OF SAMPLE (feet): 4

SAMPLE DESCRIPTION/COMMENTS: Northwest of hangar, southeast of JP-4 tank outside of berm. Gravelly sand, (SW), very fine to coarse subR sand. SubR gravel to 1/4 inch. Loose, moist, medium brown. Sampled just above permafrost.

SAMPLING METHOD: Hand auger, grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
11:00	0 BH				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED							
		BARROW LAB				ANCHORAGE LAB	
ANALYSES	✓	CONTAINERS		ANALYSES	✓	CONTAINERS	
		WATER	SOIL			WATER	SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010	✓	1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet)
(i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 08/27/93 SAMPLE ID: BRW-SS03-S06-4

RADAR STATION: Barrow WEATHER: Foggy, 50°F

SITE/AOC: SS03, Air Terminal Building FEET FROM FIXED POINT: 135 MAGNETIC HEADING: 285°

FIXED POINT: Northwest corner of hangar.

SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: AP, DN

TIME SAMPLED: 11:15 DEPTH OF SAMPLE (feet): 4

SAMPLE DESCRIPTION/COMMENTS: Northwest of hangar, south of JP-4 tank outside of berm. Gravelly sand, fine to coarse subR sand, subR gravel to 1/4 inch. Loose, moist, medium brown. Beach deposit. Sampled just above permafrost.

SAMPLING METHOD: Hand auger, grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
11:15	0 HS				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED							
ANALYSES	✓	BARROW LAB CONTAINERS		ANALYSES	✓	ANCHORAGE LAB CONTAINERS	
		WATER	SOIL			WATER	SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010	✓	1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 08/27/93 SAMPLE ID: BRW-SS03-S07-4

RADAR STATION: Barrow WEATHER: Foggy, 50°F

SITE/AOC: SS03, Air Terminal Building FEET FROM FIXED POINT: 135 MAGNETIC HEADING: 285°

FIXED POINT: Northwest corner of hangar.

SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: AP, DN

TIME SAMPLED: 11:15 (11:20 on bottles) DEPTH OF SAMPLE (feet): 4

SAMPLE DESCRIPTION/COMMENTS: Northwest of hangar, south of JP-4 tank outside of berm. Gravelly sand, fine to coarse subR sand, subR gravel to 1/4 inch. Loose, moist, medium brown. Beach deposit. Sampled just above permafrost.

SAMPLING METHOD: Hand auger, grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ■ Replicate of Soil Sample ID BRW-SS03-S06

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
11:15	0 HS				
BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)					

✓ CHECK ANALYSES REQUESTED							
ANALYSES	✓	BARROW LAB CONTAINERS		ANALYSES	✓	ANCHORAGE LAB CONTAINERS	
		WATER	SOIL			WATER	SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010	✓	1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 09/06/93 SAMPLE ID: BRW-SS03-2S08-1

RADAR STATION: Barrow WEATHER: Overcast, windy (~40 mph), sleet

SITE/AOC: SS03, Air Terminal Building FEET FROM FIXED POINT: 350 MAGNETIC HEADING: 0° North

FIXED POINT: 170° to northwest corner of hangar, 201° to west corner of hangar, 139° to radome.

SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: JP, RC

TIME SAMPLED: 10:00 DEPTH OF SAMPLE (feet): 0.5

SAMPLE DESCRIPTION/COMMENTS: Wet, black, sandy silt, medium to coarse sand.

SAMPLING METHOD: Grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS

TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS

TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH		1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
VPH	✓			TSS		250 ml	---
EPH	✓			TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

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SAMPLE COLLECTION LOG

DATE: 09/06/93 SAMPLE ID: BRW-SS03-2S09-.5
RADAR STATION: Barrow WEATHER: Overcast, windy (~40 mph), sleet
SITE/AOC: SS03, Air Terminal Building FEET FROM FIXED POINT: 270 MAGNETIC HEADING: 350°
FIXED POINT: 184° to northeast corner of hangar, 217° to southwest corner of hangar, 143° to radome.
SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)
SAMPLERS: JP, RC
TIME SAMPLED: 16:10 DEPTH OF SAMPLE (feet): 0.5
SAMPLE DESCRIPTION/COMMENTS: Gravelly sand, trace silt, wet, coarse sand.

SAMPLING METHOD: Grab
QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes
☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID
☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER	SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	SOIL
TPH		1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
VPH	✓			TSS		250 ml	---
EPH	✓			TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C
Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet)
(i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)
Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

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SAMPLE COLLECTION LOG

DATE: 09/06/93 SAMPLE ID: BRW-SS03-2S10-.5

RADAR STATION: Barrow WEATHER: Overcast, windy (~40 mph), sleet

SITE/AOC: SS03, Air Terminal Building FEET FROM FIXED POINT: MAGNETIC HEADING: 265°

FIXED POINT: 272° to southeast corner of hangar, 243° to southeast corner of ATV building, 150° to radome.

SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: JP, RC

TIME SAMPLED: 16:20 DEPTH OF SAMPLE (feet): 0.5

SAMPLE DESCRIPTION/COMMENTS: Wet, gravelly sand, coarse to medium sand, trace silt.

SAMPLING METHOD: Grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS

TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS

TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER		BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER		ANCHORAGE LAB CONTAINERS SOIL
TPH		1 liter		8 oz	VOC (8260)		3 x 40 ml		4 oz
PCB					SVOC (8270)		1 liter		8 oz
PESTICIDES					TOTAL METALS		1 liter		8 oz
HVOC 8010		1 x 40 ml		4 oz	DISS METALS		1 liter		---
VOC-BTEX 8020	✓				TDS		250 ml		---
VPH	✓				TSS		250 ml		---
EPH	✓				TOC		500 ml		4 oz
					TCLP		2 liters		2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 09/06/93 SAMPLE ID: BRW-SS03-2S11-.5

RADAR STATION: Barrow WEATHER: Overcast, windy (~40 mph), sleet

SITE/AOC: SS03, Air Terminal Building FEET FROM FIXED POINT: 540 MAGNETIC HEADING: ~270°

FIXED POINT: 281° to northeast corner of hangar, 265° to southeast corner of ATV building, 151° to radome.

SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: JP, RC

TIME SAMPLED: 16:15 DEPTH OF SAMPLE (feet): 0.5

SAMPLE DESCRIPTION/COMMENTS: Wet, clayey silt, brown, trace sand, trace organics.

SAMPLING METHOD: Grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ■ Replicate of Soil Sample ID BRW-SS03-2S12-.5

WATER PARAMETERS

TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS

TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH		1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
VPH	✓			TSS		250 ml	---
EPH	✓			TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 09/06/93 SAMPLE ID: BRW-SS03-2S12-.5

RADAR STATION: Barrow WEATHER: Overcast, windy (~40 mph), sleet

SITE/AOC: SS03, Air Terminal Building FEET FROM FIXED POINT: 540 MAGNETIC HEADING: ~270°

FIXED POINT: 281° to northeast corner of hangar, 265° to southeast corner of ATV building, 151° to radome.

SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: JP, RC

TIME SAMPLED: 16:30 DEPTH OF SAMPLE (feet): 0.5

SAMPLE DESCRIPTION/COMMENTS: Wet, clayey silt, brown, trace sand, trace organics.

SAMPLING METHOD: Grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ■ Replicate of Soil Sample ID BRW-SS03-2S11

WATER PARAMETERS

TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS

TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH		1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
VPH	✓			TSS		250 ml	---
EPH	✓			TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 08/26/93 SAMPLE ID: BRW-SS03-SD01

RADAR STATION: Barrow WEATHER: Overcast, breezy, 40°F

SITE/AOC: SS03, Air Terminal Building FEET FROM FIXED POINT: 220 MAGNETIC HEADING: 233°

FIXED POINT: Southeast corner of ATV building.

SAMPLE MATRIX: ☐ Soil (S) ■ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: SS, RC

TIME SAMPLED: 16:30 DEPTH OF SAMPLE (feet): 0.5

SAMPLE DESCRIPTION/COMMENTS: Black sandy gravel, saturated, 40% gravel. Same location as BRW-SS03-SW01.

SAMPLING METHOD:

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

BG=1.3	MONITORING READINGS				
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
16:32	NR				
BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)					

✓ CHECK ANALYSES REQUESTED							
ANALYSES	✓	BARROW LAB CONTAINERS		ANALYSES	✓	ANCHORAGE LAB CONTAINERS	
		WATER	SOIL			WATER	SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB	✓			SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010	✓	1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

ALASKA\4109641303\SS03SD01

SAMPLE COLLECTION LOG

DATE: 08/26/93 SAMPLE ID: BRW-SS03-SD02

RADAR STATION: Barrow WEATHER: Overcast, fog, breezy, 40°F

SITE/AOC: SS03, Air Terminal Building FEET FROM FIXED POINT: 250 MAGNETIC HEADING: 170°

FIXED POINT: Southeast corner of ATV building.

SAMPLE MATRIX: ☐ Soil (S) ■ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: SS, RC

TIME SAMPLED: 16:40 DEPTH OF SAMPLE (feet): 0.5

SAMPLE DESCRIPTION/COMMENTS: Same location as BRW-SS03-SW02. Black silty sand, petroleum odor, sheen, some gravel.

SAMPLING METHOD:

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

BG=1.3	MONITORING READINGS				
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
16:42	NR				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB	✓			SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010	✓	1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

ALASKA\4109641303\SS03SD02

SAMPLE COLLECTION LOG

DATE: 08/26/93 SAMPLE ID: BRW-SS03-SD03

RADAR STATION: Barrow WEATHER: Overcast, breezy, 40°F

SITE/AOC: SS03, Air Terminal Building FEET FROM FIXED POINT: 270 MAGNETIC HEADING: 147°

FIXED POINT: Southeast corner of ATV building.

SAMPLE MATRIX: ☐ Soil (S) ■ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: SS, RC

TIME SAMPLED: 16:55 DEPTH OF SAMPLE (feet):

SAMPLE DESCRIPTION/COMMENTS: Same location as BRW-SS03-SW03.

SAMPLING METHOD:

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

BG=1.3 MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
16:54	NR				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED							
ANALYSES	✓	BARROW LAB CONTAINERS		ANALYSES	✓	ANCHORAGE LAB CONTAINERS	
		WATER	SOIL			WATER	SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB	✓			SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010	✓	1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 08/26/93 SAMPLE ID: BRW-SS03-SD04

RADAR STATION: Barrow WEATHER: Overcast, windy, 40°F

SITE/AOC: SS03, Air Terminal Building FEET FROM FIXED POINT: 93 MAGNETIC HEADING: 120°

FIXED POINT: Southeast corner of ATV building.

SAMPLE MATRIX: ☐ Soil (S) ■ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: SS, RC

TIME SAMPLED: 17:15 DEPTH OF SAMPLE (feet):

SAMPLE DESCRIPTION/COMMENTS: Same location as BRW-SS03-SW04. Black silty sand, saturated, petroleum odor.

SAMPLING METHOD:

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

BG=1.3 MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
17:10	NR				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB	✓			SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010	✓	1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 08/26/93 SAMPLE ID: BRW-SS03-SD05

RADAR STATION: Barrow WEATHER: Overcast, fog, breezy, 40°F

SITE/AOC: SS03, Air Terminal Building FEET FROM FIXED POINT: 204 MAGNETIC HEADING: 121°

FIXED POINT: Southeast corner of hangar.

SAMPLE MATRIX: ☐ Soil (S) ■ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: SS, RC

TIME SAMPLED: 17:30 DEPTH OF SAMPLE (feet): 0.5

SAMPLE DESCRIPTION/COMMENTS: Black, sandy gravel, sheen, 20% gravel, coarse grained sand. Same location as BRW-SS03-SW05.

SAMPLING METHOD:

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS

TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

BG=1.3 MONITORING READINGS

TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
17:17	NR				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB	✓			SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010	✓	1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 08/26/93 SAMPLE ID: BRW-SS03-SD06

RADAR STATION: Barrow WEATHER: Overcast, fog, breezy, 40°F

SITE/AOC: SS03, Air Terminal Building FEET FROM FIXED POINT: 150 MAGNETIC HEADING: 62°

FIXED POINT: Southeast corner of hangar.

SAMPLE MATRIX: ☐ Soil (S) ■ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: SS, RC

TIME SAMPLED: 17:45 DEPTH OF SAMPLE (feet): 0.5

SAMPLE DESCRIPTION/COMMENTS: Same location as BRW-SS03-SW06. Black, sandy gravel, coarse sand, sheen, 20% gravel.

SAMPLING METHOD:

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

BG=1.3

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
	NR				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED							
		BARROW LAB CONTAINERS				ANCHORAGE LAB CONTAINERS	
ANALYSES	✓	WATER	SOIL	ANALYSES	✓	WATER	SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB	✓			SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010	✓	1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 08/26/93 SAMPLE ID: BRW-SS03-SD07

RADAR STATION: Barrow WEATHER: Overcast, fog, breezy, 40°F

SITE/AOC: SS03, Air Terminal Building FEET FROM FIXED POINT: 135 MAGNETIC HEADING: 16°

FIXED POINT: North corner of hangar.

SAMPLE MATRIX: ☐ Soil (S) ■ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: SS, RC

TIME SAMPLED: 18:00 DEPTH OF SAMPLE (feet):

SAMPLE DESCRIPTION/COMMENTS: Same location as BRW-SS03-SW07. Black, sandy gravel, coarse sand, sheen, 30% gravel.

SAMPLING METHOD:

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ■ Replicate of Soil Sample ID BRW-SS03-SD08

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)					

✓ CHECK ANALYSES REQUESTED							
		BARROW LAB				ANCHORAGE LAB	
ANALYSES	✓	CONTAINERS		ANALYSES	✓	CONTAINERS	
		WATER	SOIL			WATER	SOIL
TPH	✓	1 liter	8 oz	VOC (8260)	✓	3 x 40 ml	4 oz
PCB	✓			SVOC (8270)	✓	1 liter	8 oz
PESTICIDES	✓			TOTAL METALS	✓	1 liter	8 oz
HVOC 8010	✓	1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC	✓	500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 08/26/93 SAMPLE ID: BRW-SS03-SD08
RADAR STATION: Barrow WEATHER: Overcast, fog, breezy, 40°F
SITE/AOC: SS03, Air Terminal Building FEET FROM FIXED POINT: 135 MAGNETIC HEADING: 16°
FIXED POINT: Northwest corner of hangar.
SAMPLE MATRIX: ☐ Soil (S) ■ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)
SAMPLERS: SS, RC
TIME SAMPLED: 18:00 DEPTH OF SAMPLE (feet): 0.5
SAMPLE DESCRIPTION/COMMENTS: Same location as BRW-SS03-SW07. Black, sandy gravel, coarse sand, sheen, 30% gravel.
SAMPLING METHOD:
QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes
☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID
☐ Ambient Condition Blank (AB) ■ Replicate of Soil Sample ID BRW-SS03-SD07

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED							
ANALYSES	✓	BARROW LAB CONTAINERS		ANALYSES	✓	ANCHORAGE LAB CONTAINERS	
		WATER	SOIL			WATER	SOIL
TPH	✓	1 liter	8 oz	VOC (8260)	✓	3 x 40 ml	4 oz
PCB	✓			SVOC (8270)	✓	1 liter	8 oz
PESTICIDES	✓			TOTAL METALS	✓	1 liter	8 oz
HVOC 8010	✓	1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC	✓	500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C
Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)
Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 09/06/93 SAMPLE ID: BRW-SS03-SD09

RADAR STATION: Barrow WEATHER: Overcast, windy (~40 mph), sleet

SITE/AOC: SS03, Air Terminal Building FEET FROM FIXED POINT: ~1,000 MAGNETIC HEADING: 340°

FIXED POINT: 340° to southeast corner of hangar, 331° to southeast corner of ATV building, 135° to radome.

SAMPLE MATRIX: ☐ Soil (S) ■ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: JD

TIME SAMPLED: 16:00 DEPTH OF SAMPLE (feet): 0.5

SAMPLE DESCRIPTION/COMMENTS: Black, sandy silt, some organics, medium to coarse.

SAMPLING METHOD: Grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS

TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS

TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER	SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	SOIL
TPH		1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
VPH	✓			TSS		250 ml	---
EPH	✓			TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

ALASKA\4109641303\SS03SD09

SAMPLE COLLECTION LOG

DATE: 09/06/93 SAMPLE ID: BRW-SS03-SD10

RADAR STATION: Barrow WEATHER: Overcast, windy (~40 mph), sleet

SITE/AOC: SS03, Air Terminal Building FEET FROM FIXED POINT: 450 MAGNETIC HEADING: 317°

FIXED POINT: 317° to SE corner of hangar, 282° to SE corner of ATV building, 148° to radome.

SAMPLE MATRIX: ☐ Soil (S) ■ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: JD

TIME SAMPLED: 16:05 DEPTH OF SAMPLE (feet): 0.5

SAMPLE DESCRIPTION/COMMENTS: Black, silty sand, coarse sand, trace organics.

SAMPLING METHOD: Grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH		1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz
				EPH/VPH	✓		

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 08/26/93 SAMPLE ID: BRW-SS03-SW01

RADAR STATION: Barrow WEATHER: Foggy, 37°F

SITE/AOC: SS03, Air Terminal Building FEET FROM FIXED POINT: 220 MAGNETIC HEADING: 233°

FIXED POINT: Southeast corner of ATV building

SAMPLE MATRIX: ☐ Soil (S) ☐ Sediment (SD) ■ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: JP, DN, JD

TIME SAMPLED: 16:15 DEPTH OF SAMPLE (feet):

SAMPLE DESCRIPTION/COMMENTS: Southeast of ATV building, effervesence. Same location as SS03-SD01.

SAMPLING METHOD: Grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY
16:15	8.2	1,040 μS	8°C		

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)					

✓ CHECK ANALYSES REQUESTED								
		BARROW LAB				ANCHORAGE LAB		
ANALYSES	✓	CONTAINERS		ANALYSES	✓	CONTAINERS		
		WATER	SOIL			WATER		SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml		4 oz
PCB	✓			SVOC (8270)		1 liter		8 oz
PESTICIDES				TOTAL METALS		1 liter		8 oz
HVOC 8010	✓	1 x 40 ml	4 oz	DISS METALS		1 liter		---
VOC-BTEX 8020	✓			TDS		250 ml		---
				TSS		250 ml		---
				TOC		500 ml		4 oz
				TCLP		2 liters		2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 08/26/93 SAMPLE ID: BRW-SS03-SW02

RADAR STATION: Barrow WEATHER: Foggy, 37°F

SITE/AOC: SS03, Air Terminal Building FEET FROM FIXED POINT: 250 MAGNETIC HEADING: 170°

FIXED POINT: Southeast corner of ATV building

SAMPLE MATRIX: ☐ Soil (S) ☐ Sediment (SD) ■ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: JP, DN, JD

TIME SAMPLED: 16:30 DEPTH OF SAMPLE (feet):

SAMPLE DESCRIPTION/COMMENTS: Southeast of ATV building. Same location as SS03-SD02.

SAMPLING METHOD: Grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS

TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY
16:30	8.6	960 μS	8°C		

MONITORING READINGS

TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

		BARROW LAB CONTAINERS				ANCHORAGE LAB CONTAINERS	
ANALYSES	✓	WATER	SOIL	ANALYSES	✓	WATER	SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB	✓			SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010	✓	1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 08/26/93 SAMPLE ID: BRW-SS03-SW03

RADAR STATION: Barrow WEATHER: Foggy, 37°F

SITE/AOC: SS03, Air Terminal Building FEET FROM FIXED POINT: 270 MAGNETIC HEADING: 147°

FIXED POINT: Southeast corner of ATV building

SAMPLE MATRIX: ☐ Soil (S) ☐ Sediment (SD) ■ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: JP, DN, JD

TIME SAMPLED: 16:45 DEPTH OF SAMPLE (feet):

SAMPLE DESCRIPTION/COMMENTS: Southeast of ATV building. Same location as SS03-SD03.

SAMPLING METHOD: Grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS

TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY
16:45	8.2	1,140 μS	6°C		

MONITORING READINGS

TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB	✓			SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010	✓	1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 08/26/93 SAMPLE ID: BRW-SS03-SW04

RADAR STATION: Barrow WEATHER: Foggy, 37°F

SITE/AOC: SS03, Air Terminal Building FEET FROM FIXED POINT: 93 MAGNETIC HEADING: 120°

FIXED POINT: Southeast corner of ATV building

SAMPLE MATRIX: ☐ Soil (S) ☐ Sediment (SD) ■ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: JD, DN

TIME SAMPLED: 17:00 DEPTH OF SAMPLE (feet):

SAMPLE DESCRIPTION/COMMENTS: Southeast of ATV building. Same location as SS03-SD04. Replicate SS03-SW08 collected here.

SAMPLING METHOD: Grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ■ Duplicate of Water Sample ID SS03-SW08

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS

TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY
17:00	8.7	1,120 µS	7°C		

MONITORING READINGS

TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH	✓	1 liter	8 oz	VOC (8260)	✓	3 x 40 ml	4 oz
PCB	✓			SVOC (8270)	✓	1 liter	8 oz
PESTICIDES	✓			TOTAL METALS	✓	1 liter	8 oz
HVOC 8010	✓	1 x 40 ml	4 oz	DISS METALS	✓	1 liter	---
VOC-BTEX 8020	✓			TDS	✓	250 ml	---
				TSS	✓	250 ml	---
				TOC	✓	500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 08/26/93 SAMPLE ID: BRW-SS03-SW05
RADAR STATION: Barrow WEATHER: Foggy, 36°F
SITE/AOC: SS03, Air Terminal Building FEET FROM FIXED POINT: 204 MAGNETIC HEADING: 121°
FIXED POINT: Northwest corner of hangar.
SAMPLE MATRIX: ☐ Soil (S) ☐ Sediment (SD) ■ Surface Water (SW) ☐ Groundwater (GW)
SAMPLERS: JP, JD, DN
TIME SAMPLED: 17:25 DEPTH OF SAMPLE (feet):
SAMPLE DESCRIPTION/COMMENTS: Southeast of hangar. Same location as SS03-SD05.

SAMPLING METHOD: Grab
QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes
☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID
☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY
17:25	7.4	1,220 µS	7°C		

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)					

✓ CHECK ANALYSES REQUESTED										
ANALYSES	✓	BARROW LAB CONTAINERS			ANALYSES	✓	ANCHORAGE LAB CONTAINERS		
		WATER		SOIL			WATER		SOIL
TPH	✓	1 liter		8 oz	VOC (8260)		3 x 40 ml		4 oz
PCB	✓				SVOC (8270)		1 liter		8 oz
PESTICIDES					TOTAL METALS		1 liter		8 oz
HVOC 8010	✓	1 x 40 ml		4 oz	DISS METALS		1 liter		---
VOC-BTEX 8020	✓				TDS		250 ml		---
					TSS		250 ml		---
					TOC		500 ml		4 oz
					TCLP		2 liters		2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C
Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)
Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 08/26/93 SAMPLE ID: BRW-SS03-SW06

RADAR STATION: Barrow WEATHER: Foggy, 36°F

SITE/AOC: SS03, Air Terminal Building FEET FROM FIXED POINT: 150 MAGNETIC HEADING: 62°

FIXED POINT: South corner of hangar.

SAMPLE MATRIX: ☐ Soil (S) ☐ Sediment (SD) ■ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: JP, JD, DN

TIME SAMPLED: 17:30 DEPTH OF SAMPLE (feet):

SAMPLE DESCRIPTION/COMMENTS: Southeast of hangar. Same location as SS03-SD06.

SAMPLING METHOD: Grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS

TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY
17:30	8.4	1,260	7°C		

MONITORING READINGS

TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH	✓	1 liter	8 oz	VOC (8260)		3 x 40 ml	4 oz
PCB	✓			SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010	✓	1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

ALASKA\4109641303\SS03SW06

SAMPLE COLLECTION LOG

DATE: 08/26/93 SAMPLE ID: BRW-SS03-SW07

RADAR STATION: Barrow WEATHER: Foggy, 36°F

SITE/AOC: SS03, Air Terminal Building FEET FROM FIXED POINT: 135 MAGNETIC HEADING: 16°

FIXED POINT: North corner of hangar.

SAMPLE MATRIX: ☐ Soil (S) ☐ Sediment (SD) ■ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: JP, JD, DN

TIME SAMPLED: 17:40 DEPTH OF SAMPLE (feet):

SAMPLE DESCRIPTION/COMMENTS: North of hangar. Same location as SD07.

SAMPLING METHOD: Grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY
	8.0	1,570 µS	8°C		

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED									
		BARROW LAB					ANCHORAGE LAB		
ANALYSES	✓	CONTAINERS			ANALYSES	✓	CONTAINERS		
		WATER		SOIL			WATER		SOIL
TPH	✓	1 liter		8 oz	VOC (8260)	✓	3 x 40 ml		4 oz
PCB	✓				SVOC (8270)	✓	1 liter		8 oz
PESTICIDES					TOTAL METALS	✓	1 liter		8 oz
HVOC 8010	✓	1 x 40 ml		4 oz	DISS METALS	✓	1 liter		---
VOC-BTEX 8020	✓				TDS	✓	250 ml		---
					TSS	✓	250 ml		---
					TOC	✓	500 ml		4 oz
					TCLP		2 liters		2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

ALASKA\4109641303\SS03SW07

SAMPLE COLLECTION LOG

DATE: 08/26/93 SAMPLE ID: BRW-SS03-SW08
RADAR STATION: Barrow WEATHER: Foggy, 37°F
SITE/AOC: SS03, Air Terminal Building FEET FROM FIXED POINT: 93 MAGNETIC HEADING: 120°
FIXED POINT: Southeast corner of ATV building.
SAMPLE MATRIX: ☐ Soil (S) ☐ Sediment (SD) ■ Surface Water (SW) ☐ Groundwater (GW)
SAMPLERS: JD, DN
TIME SAMPLED: 17:00 DEPTH OF SAMPLE (feet): Surface Water
SAMPLE DESCRIPTION/COMMENTS: Southeast of ATV building.

SAMPLING METHOD: Grab
QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes
☐ Trip Blank (TB) ■ Duplicate of Water Sample ID BRW-SS03-SW04
☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS

TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY
17:00	8.7	1,180 μS	7°C		

MONITORING READINGS

TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH	✓	1 liter	8 oz	VOC (8260)	✓	3 x 40 ml	4 oz
PCB	✓			SVOC (8270)	✓	1 liter	8 oz
PESTICIDES	✓			TOTAL METALS	✓	1 liter	8 oz
HVOC 8010	✓	1 x 40 ml	4 oz	DISS METALS	✓	1 liter	---
VOC-BTEX 8020	✓			TDS	✓	250 ml	---
				TSS	✓	250 ml	---
				TOC	✓	500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C
Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)
Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOGS FOR BACKGROUND (BKGD)

SAMPLE COLLECTION LOG

DATE: 8-26-93 SAMPLE ID: BRW-BKGD-S01
RADAR STATION: Barrow WEATHER: Overcast, fog, breezy, 40°F
SITE/AOC: Background FEET FROM FIXED POINT: ______ MAGNETIC HEADING: See below
FIXED POINT: 293° to top of radome; 276° to SW corner of garage; 310° to SE corner of main building train
SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)
SAMPLERS: S.S., R.C.
TIME SAMPLED: 14:20 DEPTH OF SAMPLE (feet): 0' - 0.5'
SAMPLE DESCRIPTION/COMMENTS: Brown silty peat, very wet

SAMPLING METHOD:
QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes
☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID
☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
14:25	BG in B2				
	BG = 1.3				
BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)					

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH	✓	1 liter	8 oz	VOC (8260)	✓	3 x 40 ml	4 oz
PCB	✓			SVOC (8270)	✓	1 liter	8 oz
PESTICIDES	✓			TOTAL METALS	✓	1 liter	8 oz
HVOC 8101	✓	3 X 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC	✓	500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C
Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)
Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS1

SAMPLE COLLECTION LOG

DATE: 8-26-93 SAMPLE ID: BRW-BKGD-S02

RADAR STATION: Barrow WEATHER: Overcast, fog, breezy, 40°F

SITE/AOC: Background FEET FROM FIXED POINT: ______ MAGNETIC HEADING: See below

FIXED POINT: 300° to top of radome; 284° to SW corner of garage; 315° to SW corner of main building train

SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: S.S., R.C.

TIME SAMPLED: 15:00 DEPTH OF SAMPLE (feet): 0' - 0.5'

SAMPLE DESCRIPTION/COMMENTS: Brown - dark brown, silty peat, very wet

SAMPLING METHOD:

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
15:00	BG in B2				
	BG = 1.3				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED							
		BARROW LAB				ANCHORAGE LAB	
ANALYSES	✓	CONTAINERS		ANALYSES	✓	CONTAINERS	
		WATER	SOIL			WATER	SOIL
TPH	✓	1 liter	8 oz	VOC (8260)	✓	3 x 40 ml	4 oz
PCB	✓			SVOC (8270)	✓	1 liter	8 oz
PESTICIDES	✓			TOTAL METALS		1 liter	8 oz
HVOC 8010	✓	3 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 8-26-93 SAMPLE ID: BRW-BKGD-S03

RADAR STATION: Barrow WEATHER: Overcast, fog, breezy, 40°F

SITE/AOC: Background FEET FROM FIXED POINT: ______ MAGNETIC HEADING: See below

FIXED POINT: 303° to top of radome; 290° to SE corner of garage; 326° to SE corner of main building train

SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: S.S., R.C.

TIME SAMPLED: 15:15 DEPTH OF SAMPLE (feet): 0' - 0.5'

SAMPLE DESCRIPTION/COMMENTS: Clayey-silt, brown-dark brown, wet, moderate organic

SAMPLING METHOD: ______

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID ______

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID ______

WATER PARAMETERS

TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS

TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
15:10	BG in B2				
	BG = 1.3				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH	✓	1 liter	8 oz	VOC (8260)	✓	3 x 40 ml	4 oz
PCB	✓			SVOC (8270)	✓	1 liter	8 oz
PESTICIDES	✓			TOTAL METALS	✓	1 liter	8 oz
HVOC 8010	✓	3 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

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SAMPLE COLLECTION LOG

DATE: 8-26-93
SAMPLE ID: BRW-BKGD-S04
RADAR STATION: Barrow
WEATHER: Overcast, fog, 40°F
SITE/AOC: Background
FEET FROM FIXED POINT: ______ MAGNETIC HEADING: See below
FIXED POINT: 284° to top of radome; 268° to SW corner of garage; 302° to SW corner of main building
SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)
SAMPLERS: S.S., R.C.
TIME SAMPLED: 15:40
DEPTH OF SAMPLE (feet): 0' - 0.5'
SAMPLE DESCRIPTION/COMMENTS: Gray-clayey silt, some organics, very moist, firm

SAMPLING METHOD:
QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes
☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID
☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
15:40	BG in B2				
	BG = 1.3				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED							
ANALYSES	✓	BARROW LAB CONTAINERS		ANALYSES	✓	ANCHORAGE LAB CONTAINERS	
		WATER	SOIL			WATER	SOIL
TPH	✓	1 liter	8 oz	VOC (8260)	✓	3 x 40 ml	4 oz
PCB	✓			SVOC (8270)	✓	1 liter	8 oz
PESTICIDES	✓			TOTAL METALS	✓	1 liter	8 oz
HVOC 8010	✓	3 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C
Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet)
(i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)
Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 8-26-93 SAMPLE ID: BRW-BKGD-SD01
RADAR STATION: Barrow WEATHER: Overcast, breezy, 40°F
SITE/AOC: Background FEET FROM FIXED POINT: ______ MAGNETIC HEADING: See below
FIXED POINT: 294° to top of radome; 312° to SE corner of main building train; 277° to base of White Alice
SAMPLE MATRIX: ■ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)
SAMPLERS: S.S., R.C.
TIME SAMPLED: 13:55 DEPTH OF SAMPLE (feet): 0' - 0.5'
SAMPLE DESCRIPTION/COMMENTS: Same location as BRW-BKGD-SW01. Gray-brown, silty peat, trace gravel, saturated.

SAMPLING METHOD: ______

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes
☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID ______
☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID ______

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
13:50	BG in B2				
	BG = 1.3				
BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)					

✓ CHECK ANALYSES REQUESTED							
		BARROW LAB				ANCHORAGE LAB	
ANALYSES	✓	CONTAINERS		ANALYSES	✓	CONTAINERS	
		WATER	SOIL			WATER	SOIL
TPH	✓	1 liter	8 oz	VOC (8260)	✓	3 x 40 ml	4 oz
PCB	✓			SVOC (8270)	✓	1 liter	8 oz
PESTICIDES	✓			TOTAL METALS	✓	1 liter	8 oz
HVOC 8010	✓	3 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC	✓	500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C
Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet)
(i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)
Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 8-26-93
SAMPLE ID: BRW-BKGD-SW01
RADAR STATION: Barrow
WEATHER: Overcast, breezy, 45°F
SITE/AOC: Background
FEET FROM FIXED POINT:
MAGNETIC HEADING: See below
FIXED POINT: 294° to top of radome; 312° to SE corner of main building train; 277° to base of White Alice
SAMPLE MATRIX: ☐ Soil (S) ☐ Sediment (SD) ■ Surface Water (SW) ☐ Groundwater (GW)
SAMPLERS: S.S., R.C.
TIME SAMPLED: 13:50
DEPTH OF SAMPLE (feet):
SAMPLE DESCRIPTION/COMMENTS: Same location as BRW-BKGD-SD01

SAMPLING METHOD:

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes
☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID
☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS

TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY
13:38	6.8	350	5°C	1.000	

MONITORING READINGS

TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
13:40	BG in B2				
	BG = 1.3				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH	✓	1 liter	8 oz	VOC (8260)	✓	3 x 40 ml	4 oz
PCB	✓			SVOC (8270)	✓	1 liter	8 oz
PESTICIDES	✓			TOTAL METALS	✓	1 liter	8 oz
HVOC 8010	✓	3 x 40 ml	4 oz	DISS METALS	✓	1 liter	---
VOC-BTEX 8020	✓			TDS	✓	1 liter	---
				TSS	✓		
				TOC	✓	500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 8-26-93 SAMPLE ID: BRW-BKGD-SW02
RADAR STATION: Barrow WEATHER: Overcast, breezy, 45°F
SITE/AOC: Background FEET FROM FIXED POINT: ______ MAGNETIC HEADING: See below
FIXED POINT: 325 yards SE along and away from installation; 20 feet from road; 293°to top of radome; 270° to base of White Alice

SAMPLE MATRIX: ☐ Soil (S) ☐ Sediment (SD) ■ Surface Water (SW) ☐ Groundwater (GW)
SAMPLERS: S.S., R.C.
TIME SAMPLED: 11:20 DEPTH OF SAMPLE (feet): ______
SAMPLE DESCRIPTION/COMMENTS: ______
SAMPLING METHOD: ______

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ■ QA/QC Extra Volumes
☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID ______
☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID ______

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY
11:00	7.2	420 ms	40°C	1.000	

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
11:20	BG in B2				
	BG = 1.3				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED							
		BARROW LAB				ANCHORAGE LAB	
ANALYSES	✓	CONTAINERS		ANALYSES	✓	CONTAINERS	
		WATER	SOIL			WATER	SOIL
TPH	✓	3 liters	8 oz	VOC (8260)	✓	9 x 40 ml	4 oz
PCB	✓			SVOC (8270)	✓	2 liters	8 oz
PESTICIDES	✓			TOTAL METALS	✓	2 liters	8 oz
HVOC 8010	✓	9 x 40 ml	4 oz	DISS METALS	✓	2 liters	---
VOC-BTEX 8020	✓			TDS	✓	1 liter	---
				TSS	✓		
				TOC	✓	1.5 liter	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C
Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)
Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOGS FOR QA/QC

SAMPLE COLLECTION LOG

DATE: 8-26-93 SAMPLE ID: BRW-AB01

RADAR STATION: Barrow WEATHER: Still, foggy, 45°F

SITE/AOC: Ambient Blank FEET FROM FIXED POINT: ______ MAGNETIC HEADING: ______

FIXED POINT: Near steps at ABS building.

SAMPLE MATRIX: ☐ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: JD

TIME SAMPLED: 15:05 DEPTH OF SAMPLE (feet): ______

SAMPLE DESCRIPTION/COMMENTS: Grab

SAMPLING METHOD: ______

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID ______

■ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID ______

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
15:00	0.0				

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED									
ANALYSES	✓	BARROW LAB CONTAINERS			ANALYSES	✓	ANCHORAGE LAB CONTAINERS		
		WATER		SOIL			WATER		SOIL
TPH		1 liter		8 oz	VOC (8260)	✓	3 x 40 ml		4 oz
PCB					SVOC (8270)		1 liter		8 oz
PESTICIDES					TOTAL METALS		1 liter		8 oz
HVOC 8010		1 x 40 ml		4 oz	DISS METALS		1 liter		---
VOC-BTEX 8020					TDS		250 ml		---
					TSS		250 ml		---
					TOC		500 ml		4 oz
					TCLP		2 liters		2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 8-26-93 SAMPLE ID: BRW-EB01
RADAR STATION: Barrow WEATHER:
SITE/AOC: Equipment Blank FEET FROM FIXED POINT: MAGNETIC HEADING:
FIXED POINT:
SAMPLE MATRIX: ☐ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)
SAMPLERS:
TIME SAMPLED: DEPTH OF SAMPLE (feet):
SAMPLE DESCRIPTION/COMMENTS:

SAMPLING METHOD:
QA/QC SAMPLES COLLECTED: ■ Equipment Blank (EB) ☐ QA/QC Extra Volumes
☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID
☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED							
ANALYSES	✓	BARROW LAB CONTAINERS		ANALYSES	✓	ANCHORAGE LAB CONTAINERS	
		WATER	SOIL			WATER	SOIL
TPH	✓	1 liter	8 oz	VOC (8260)	✓	3 x 40 ml	4 oz
PCB	✓			SVOC (8270)	✓	1 liter	8 oz
PESTICIDES	✓			TOTAL METALS	✓	1 liter	8 oz
HVOC 8010	✓	1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C
Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet)
(i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)
Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 09/06/93 SAMPLE ID: BRW-2EB02

RADAR STATION: Barrow WEATHER:

SITE/AOC: FEET FROM FIXED POINT: MAGNETIC HEADING:

FIXED POINT:

SAMPLE MATRIX: ☐ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: SF, JP

TIME SAMPLED: DEPTH OF SAMPLE (feet):

SAMPLE DESCRIPTION/COMMENTS:

SAMPLING METHOD: Grab

QA/QC SAMPLES COLLECTED: ■ Equipment Blank (EB) ☐ QA/QC Extra Volumes

☐ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED							
		BARROW LAB				ANCHORAGE LAB	
ANALYSES	✓	CONTAINERS		ANALYSES	✓	CONTAINERS	
		WATER	SOIL			WATER	SOIL
TPH		1 liter	8 oz	VOC (8260)	✓	3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020				TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz
				VPH	✓		

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

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SAMPLE COLLECTION LOG

DATE: 8-26-93 SAMPLE ID: BRW-TB01

RADAR STATION: Barrow WEATHER:

SITE/AOC: FEET FROM FIXED POINT: MAGNETIC HEADING:

FIXED POINT:

SAMPLE MATRIX: ☐ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS:

TIME SAMPLED: 10:00 DEPTH OF SAMPLE (feet):

SAMPLE DESCRIPTION/COMMENTS: Trip Blank

SAMPLING METHOD:

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

■ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED							
		BARROW LAB				ANCHORAGE LAB	
ANALYSES	✓	CONTAINERS		ANALYSES	✓	CONTAINERS	
		WATER	SOIL			WATER	SOIL
TPH		1 liter	8 oz	VOC (8260)	✓	3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010	✓	1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020	✓			TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 8-27-93 SAMPLE ID: BRW-TB02
RADAR STATION: Barrow WEATHER: Foggy
SITE/AOC: Trip Blank FEET FROM FIXED POINT: ________ MAGNETIC HEADING: ________
FIXED POINT: ________
SAMPLE MATRIX: ☐ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)
SAMPLERS: ICF KE
TIME SAMPLED: 10:00 DEPTH OF SAMPLE (feet): ________
SAMPLE DESCRIPTION/COMMENTS: ________

SAMPLING METHOD: CTE prepared
QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes
■ Trip Blank (TB) ☐ Duplicate of Water Sample ID ________
☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID ________

WATER PARAMETERS					
TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS					
TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		
BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)					

✓ CHECK ANALYSES REQUESTED										
ANALYSES	✓	BARROW LAB CONTAINERS			ANALYSES	✓	ANCHORAGE LAB CONTAINERS		
		WATER		SOIL			WATER		SOIL
TPH		1 liter		8 oz	VOC (8260)	✓	3 x 40 ml		4 oz
PCB					SVOC (8270)		1 liter		8 oz
PESTICIDES					TOTAL METALS		1 liter		8 oz
HVOC 8010	✓	1 x 40 ml		4 oz	DISS METALS		1 liter		---
VOC-BTEX 8020	✓				TDS		250 ml		---
					TSS		250 ml		---
					TOC		500 ml		4 oz
					TCLP		2 liters		2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C
Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)
Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 09/06/93 SAMPLE ID: BRW-2TB03

RADAR STATION: Barrow WEATHER:

SITE/AOC: FEET FROM FIXED POINT: MAGNETIC HEADING:

FIXED POINT:

SAMPLE MATRIX: ☐ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: SF, JP

TIME SAMPLED: 10:00 DEPTH OF SAMPLE (feet):

SAMPLE DESCRIPTION/COMMENTS:

SAMPLING METHOD: Grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

■ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS

TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS

TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH		1 liter	8 oz	VOC (8260)	✓	3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020				TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz
				VPH	✓		

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

SAMPLE COLLECTION LOG

DATE: 09/08/93 SAMPLE ID: BRW-TB04

RADAR STATION: Barrow WEATHER:

SITE/AOC: FEET FROM FIXED POINT: MAGNETIC HEADING:

FIXED POINT:

SAMPLE MATRIX: ☐ Soil (S) ☐ Sediment (SD) ☐ Surface Water (SW) ☐ Groundwater (GW)

SAMPLERS: RT, RC

TIME SAMPLED: 18:00 DEPTH OF SAMPLE (feet):

SAMPLE DESCRIPTION/COMMENTS:

SAMPLING METHOD: Grab

QA/QC SAMPLES COLLECTED: ☐ Equipment Blank (EB) ☐ QA/QC Extra Volumes

■ Trip Blank (TB) ☐ Duplicate of Water Sample ID

☐ Ambient Condition Blank (AB) ☐ Replicate of Soil Sample ID

WATER PARAMETERS

TIME	PH	CONDUCTIVITY	TEMPERATURE	SPECIFIC GRAVITY	TURBIDITY

MONITORING READINGS

TIME	PID READING (ppm)	CG/LEL (%)	HANBY SCREENING (standard/ppm)		

BG=Background; BZ=Breathing Zone; BH=Borehole; NR=No Readings; HS=Headspace; S=Sample (uncontained)

✓ CHECK ANALYSES REQUESTED

ANALYSES	✓	BARROW LAB CONTAINERS WATER	BARROW LAB CONTAINERS SOIL	ANALYSES	✓	ANCHORAGE LAB CONTAINERS WATER	ANCHORAGE LAB CONTAINERS SOIL
TPH		1 liter	8 oz	VOC (8260)	✓	3 x 40 ml	4 oz
PCB				SVOC (8270)		1 liter	8 oz
PESTICIDES				TOTAL METALS		1 liter	8 oz
HVOC 8010		1 x 40 ml	4 oz	DISS METALS		1 liter	---
VOC-BTEX 8020				TDS		250 ml	---
				TSS		250 ml	---
				TOC		500 ml	4 oz
				TCLP		2 liters	2 x 8 oz

Preservation: HVOC and VOC: HCl to pH <2; metals: HNO_3 to pH <2; Ice all samples to 4°C

Sample ID Format: Radar Station - site identifier - matrix + sample number - depth (feet) (i.e., BUL-ST05-SW07, BTR-EB04, WRT-SS08-S09-5.0)

Radar Station Codes: Bullen=BUL; Oliktok=OLI; Barter=BTR; Lonely=LON; Barrow=BRW; Wainwright=WRT; Lay=LAY; Lisburne=LIS

APPENDIX E

CHAIN-OF-CUSTODY FORMS

ICF KAISER ENGINEERS

CHAIN OF CUSTODY RECORD

NO. 0549

PROJ. NO.	PROJECT NAME	NO. OF CONTAINERS	YR MO NO.
4116 412-01	DEW Line RI/FS		

SAMPLERS: (Signature) [illegible]

STAT. NO.	DATE 1993	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CON-TAINERS	VOC 8260	SVOC	total metals	diss/wed metals	TDS	TSS	TOC	REMARKS
Barrow	4-26	1355		X	BRW-BKGD-SW01	4	1	1	1				1	
↓	↓	1420		↓	BRW-BKGD-SD01	4	1	1	1				1	
↓	↓	1500		↓	BRW-BKGD-SD02	3	1	1	1					
↓	↓	1515		↓	BRW-BKGD-SD03	3	1	1	1					
↓	↓	1540		↓	BRW-BKGD-SD04	3	1	1	1					
↓	↓	1800		↓	BRW-AOC2-SD07	4	1	1	1				1	VOC 8260 [illegible]
↓	↓	1900		↓	BRW-AOC2-SD03	4	1	1	1				1	

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[illegible]	4-26-93 1800	[illegible]	[illegible]		~~Fed Ex # [illegible]~~ ~~[illegible]~~
[illegible]	4-26-93 2000	~~[illegible]~~ MARK AIR 0902-1736			
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks:	

ICF KAISER ENGINEERS

CHAIN OF CUSTODY RECORD

NO. 0550

PROJ. NO.	PROJECT NAME	NO. (YR MO)
4102-412 01	DEW Line KI/FS	

SAMPLERS: (Signature) D. Noe

STAT. NO.	DATE 1993	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CON-TAINERS	VOC 8260	SVOC	total metals	dissolved metals	TDS	TSS	TOC	REMARKS
Barrow	8-26	1000		X	BKW-TB01	2	2							
		1505			BRW-AP01	3	3							
					~~BRW-EB01~~									NA SJF
		1350			BRW-~~SW~~ BKGD-SW01	9	3	2	1	1	1 →		1	
		1120			BRW-BKGD-SW02	3	3							
		1700			BRW-AOC2-SW04	3	3							
		1740			BRW-AOC2-SW07	3	3							
		1700			BRW-AOC2-SW08	3	3							

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
D. Noe	8-26-93 1800	[signature]			~~FedEx # SJF 8044406693~~
[signature]	8-26-93 2000	Mark Air ~~[illegible]~~ 0962-1740			

Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks:

ICF KAISER ENGINEERS

CHAIN OF CUSTODY RECORD

NO. 0551

PROJ. NO.	PROJECT NAME
4191-412-01	DEW Line KI/FS

SAMPLERS: (Signature)

YR MO NO.

STAT. NO.	DATE 1993	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CON-TAINERS	HVOC	VOC 8020	PCB	TPH	Pesticides			REMARKS
Barrow	8-26	1355		X	BRW - BKGD SD01	2	1 →	→	1 →	→				
↓	↓	1420		↓	BRW - BKGD - S01	2	1 →	→	1 →	→				
		1500			BRW - BKGD - S02	2	1 →	→	1 →	→				
		1515			BRW - BKGD - S03	2	1 →	→	1 →	→				
		1540			BRW - BKGD - S04	2	1 →	→	1 →	→				
		1630			BRW - AOC2 - SD01	2	1 →	→	1 →					
		1640			BRW - AOC2 - SD02	2	1 →	→	1 →					
		1655			BRW - AOC2 - SD03	2	1 →	→	1 →					
		1700			BRW - AOC2 - SD04	2	1 →	→	1 →					
		1730			BRW - AOC2 - SD05	2	1 →	→	1 →					
		1745			BRW - AOC2 - SD06	2	1 →	→	1 →					
		1900			BRW - AOC2 - SD07	2	1 →	→	1 →	→				
↓	↓	1600		↓	BRW - AOC2 - SD08	2	1 →	→	1 →	→				

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
	8-26-93 1830	[signature]	[signature]		[signature]
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks:	
			[illegible] 1130		

ICF KAISER ENGINEERS

CHAIN OF CUSTODY RECORD

NO. 0551

PROJ. NO.	PROJECT NAME
4196-412-01	DEW Line RI/FS

SAMPLERS: (Signature)

YR MO NO.

all soils

STAT. NO.	DATE 1993	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	HVOC	VOC 8020	PCB	TPH	Pesticides	REMARKS
Barrow	8-26	1355		X	BRW - BKGD SD01	2	1 →	→	1 →	→		817-18 (84) 07
		1420			BRW - BKGD - S01	2	1 →	→	1 →	→		819-20
		1500			BRW - BKGD - S02	2	1 →	→	1 →	→		821-22
		1515			BRW - BKGD - S03	2	1 →	→	1 →	→		823-24
		1540			BRW - BKGD - S04	2	1 →	→	1 →	→		825-26
		1630			BRW - AOC2 - SD01	2	1 →	→	1 →			827-28
		1640			BRW - AOC2 - SD02	2	1 →	→	1 →			829-30
		1655			BRW - AOC2 - SD03	2	1 →	→	1 →			831-32
		1700			BRW - AOC2 - SD04	2	1 →	→	1 →			833-34
		1730			BRW - AOC2 - SD05	2	1 →	→	1 →			835-36
		1745			BRW - AOC2 - SD06	2	1 →	→	1 →			837-38
		1800			BRW - AOC2 - SD07	2	1 →	→	1 →	→		839-40
		1600			BRW - AOC2 - SD08	2	1 →	→	1 →	→		841-42

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
	8-26-93 1830				
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks:	
			[illegible] 11:00		

ICF KAISER ENGINEERS

CHAIN OF CUSTODY RECORD

NO 0552

PROJ. NO.	PROJECT NAME				
91096-412-01	DEW Line RI/FS				

SAMPLERS: *(Signature)* David Noe

YR MO NO.

STAT. NO.	DATE 1993	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	HVOC	VOC 8020	PCB	TPH	Pesticides			REMARKS
BARROW	8-26	1000		X	BKW-TB01	2	2→							
↓	↓			↓	~~BKW-EB01~~									NA Sof
↓	↓	1350		↓	BKW-BKGD-SW01	4	3→		1→					
↓	↓	1120		↓	BKW-BKGD-SW02	12	9→		3→					
↓	↓	1115		↓	BKW-AOC2-SW01	3	3→							
↓	↓	1130		↓	BKW-AOC2-SW02	3	3→							
↓	↓	1645		↓	BKW-AOC2-SW03	3	3→							
↓	↓	1700		↓	BKW-AOC2-SW04	3	3→							
↓	↓	1725		↓	BKW-AOC2-SW05	3	3→							
↓	↓	1730		↓	BKW-AOC2-SW06	3	3→							
↓	↓	1730		↓	BKW-AOC2-SW07	3	3→							
↓	↓	1700		↓	BKW-AOC2-SW08	3	3→							Time is 1700

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
David Noe	8-26-93 1800	[signature]	[signature]		

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*

Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks:

ICF KAISER ENGINEERS

CHAIN OF CUSTODY RECORD

NO. 0553

PROJ. NO.	PROJECT NAME
4196.412-01	DEW Line KI/FS

SAMPLERS: *(Signature)* D. Noe

YR	MO	NO.

STAT. NO.	DATE 1993	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOC 8260	SVOC	total metals	dissolved metals	TDS	TSS	TOC	REMARKS
Barion	8-26	1120		X	BRW-BKGD-SW02	13	6	2	2	1 →	→	2		
↓	↓	1700		↓	BRN-AOC2-SW03	2				1	1			

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
D. Noe	8-26-93 1800	[signature]	[signature]	8-26-93 2000	~~[signature]~~ Mark Air 0902-17?
Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*

Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks:

ICF KAISER ENGINEERS

CHAIN OF CUSTODY RECORD

NO. 0554

PROJ. NO.	PROJECT NAME
41096-412-01	DEW Line KI/FS

SAMPLERS: (Signature) D J Noe

NO. | YR | MO

STAT. NO.	DATE 1993	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	HVOC	VOC 8020	PCB	TPH	Pesticides			REMARKS
Barrow	8-26	1615		X	BRW-AOC2-SW01	1			1 →					
		1630			BRW-AOC2-SW02	1			1 →					
		1645			BRW-AOC2-SW03	1			1 →					
		1700			BRW-AOC2-SW04	1			1 →					
		1725			BRW-AOC2-SW05	1			1 →					
		1730			BRW-AOC2-SW06	1			1 →					
		1740			BRW-AOC2-SW07	1			1 →					
		1700			BRW-AOC2-SW08	1			1 →					

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
D J Noe	8-26-93 1400	[signature]	[signature]		
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks:	

ICF KAISER ENGINEERS

CHAIN OF CUSTODY RECORD

NO. 0554

PROJ. NO.	PROJECT NAME
41096-412-01	DEW Line RI/FS

SAMPLERS: *(Signature)* D. Noe

STAT. NO.	DATE 1993	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CON-TAINERS	HVOC	VOC 8020	PCB	TPH	pesticides			REMARKS waters only
Barrow	8·26	1615		X	BRW-AOC2-SWØ1	1			1 →					843 1 L
↓	↓	1630		↓	BRW-AOC2-SWØ2	1			1 →					844 ↓
		1645			BRW-AOC2-SWØ3	1			1 →					845
		1700			BRW-AOC2-SWØ4	1			1 →					846
		1725			BRW-AOC2-SWØ5	1			1 →					847
		1730			BRW-AOC2-SWØ6	1			1 →					848
		1740			BRW-AOC2-SWØ7	1			1 →					849
		1700			BKW-AOC2-SWØ8	1			1 →					850

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
D. Noe	8/26/93 1800	[signature]	[signature]		
Relinquished by: *(Signature)*	**Date / Time**	**Received by:** *(Signature)*	**Relinquished by:** *(Signature)*	**Date / Time**	**Received by:** *(Signature)*

Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks:
		[signature]	[illegible]93 1100	

ICF KAISER ENGINEERS

CHAIN OF CUSTODY RECORD

No 0555

PROJ. NO.	PROJECT NAME
41696-412-01	DEW Line KI/FS

SAMPLERS: *(Signature)* D. Noe

YR MO NO.

STAT. NO.	DATE 1993	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CON-TAINERS		VOC 8260	SVOC	total metals	dissolved metals	TDS	TSS	TOC	REMARKS
✓ Barrow	8-26	1700		X	BRW-AOC2-SW01	7		2	1	1	1	1	1		
✓ ↓	↓	1710		↓	BRW-AOC2-SW07	7		2	1	1	1	1	1		
✓ ↓	↓	1700		↓	BRW-AOC2-SW08	5		2	1	1			1		

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
D. Noe	8/26/93 1800	[signature]	[signature]	8-26-93 2000	~~[illegible]~~ Mark Air 0902-1725

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*

Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks:

ICF KAISER ENGINEERS

CHAIN OF CUSTODY RECORD

NO. 0556

PROJ. NO.	PROJECT NAME	YR MO NO.
4141 412 01	DEW Line RI/FS	

SAMPLERS: (Signature) [signatures]

STAT. NO.	DATE 1993	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	11VOC	VOC 8020	PCB	TPH	Pesticides		REMARKS
Barrow	9-27	1000		X	BRW - TB02	2	2 →						
		1200			BRW - EB01	4	3 →	1 →					
		1315			BRW - SS01 - SW01	4	3		1				[illegible] VOC 8020 + 418.1 only
		1325			BRW - SS01 - SW02	4	3		1				
		1335			BRW - SS01 - SW03	4	3		1				
		1345			BRW - SS01 - SW04	4	3		1				
		1355			BRW - SS01 - SW05	4	3		1				
		1400			BRW - SS01 - SW06	4	3		1				
		1410			BRW - SS01 - SW07	3	3						
		1330			BRW - SS01 - SW08	3	3						

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[signature]	8-27-93 1720	[signature]	[signature]	9-27-93 1900	[signature]
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks:	

ICF KAISER ENGINEERS

CHAIN OF CUSTODY RECORD

NO. 0557

PROJ. NO.	PROJECT NAME
41096-412.01	DEW Line KIIFS

SAMPLERS: (Signature) D. J Noe Robert Cotterill

YR MO NO.

STAT. NO.	DATE 1993	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CON-TAINERS	IIVOC	VOC 8020	PCP	TPH	Pesticides			REMARKS
Barrow	8-27	1100		X	BRW-AOC2-S01	2	1→			1				Stationl.c BRW-AOC2-S01
↓	↓	1120		↓	BRW-AOC2-S02	2	1→			1				
		1140			BRW-AOC2-S03	2	1→			1				
		1135			BRW-AOC2-S04	2	1→			1				
		1100			BRW-AOC2-S05	2	1→			1				
		1115			BRW-AOC2-S06	2	1→			1				
		1120			BRW-AOC2-S07	2	1→			1				
		1320			BRW-SS01-SD01	2	~~1~~	1		1→				Run for VOC8020, TPH, & pesticides
		1450			BRW-SS01-SD02	2		1		1				
		1505			BRW-SS01-SD03	2		1		1				
		1540			BRW-SS01-SD04	2		1		1				
		1520			BRW-SS01-SD05	2		1		1				
		1455			BRW-SS02-SD01	2	1→		1——→					
		1600			BRW-SS02-S01	2	1→		1——→					
		1430			BRW-SS02-S02	2	1→		1→					
↓	↓	1440		↓	BRW-SS02-S03	2	1→		1→					

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
D. J Noe	8-27-93 1720	[signature]	[signature]	8-27-93 1700	[signature]
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks:	

ICF KAISER ENGINEERS

CHAIN OF CUSTODY RECORD

NO. 0558

PROJ. NO.	PROJECT NAME
41076.412.01	DEW Line RI/FS

SAMPLERS: (Signature) R. J. Noe Robert J. Cottingill

STAT. NO.	DATE 1993	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CON-TAINERS	HVOC	VOC 8020	PCB	TPH	Pesticides	REMARKS
Barrow	8-27	1545		X	BRW-SS01-SD06	2		1		1		
		1600			BRW-SS01-SD07	2		1		1		
		1615			BRW-SS01-SD08	2		1		1		
		1520			BKW-SS01-SD09	2		1		1		
		1315			BRW-SS01-S01	2		1		1		
		1400			BRW-SS01-S02	2		1		1		
		1420			BRW-SS01-S03	2		1		1		
		1410			BRW-SS01-SW07	1				1		
		1330			BRW-SS01-SW08	1				1		
		1415			BRW-SS02-S04	2	1 →		1 →			
		1420			BRW-SS02-S05	2	1 →		1 →			

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
R. J. Noe	8-27-93 1720	[signature]	[signature]	8-27-93 1800	Jeff [signature]
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)

Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks:

ICF KAISER ENGINEERS

CHAIN OF CUSTODY RECORD

NO. [illegible]0557

PROJ. NO.	PROJECT NAME				
4109-412-01	DEW Line RI/FS				

SAMPLERS: (Signature) D. [illegible] Robert [illegible]

STAT. NO.	DATE 1993	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOC 8260	SVOC	total metals	dissolved metals	TDS	TSS	TOC	REMARKS
Barrow	8-27	1135		X	BRW-A0C2-S04	4	1	1	1				1	
		1200			BRW-EB01	6	3	2	1					
		1006			BRW-TB01	2	2							
		1315			BRW-SS01-SW01	8	3	2			1	1	1	
		1320			BRW-SS01-SD01	2	1	1						
		1315			BRW-SS01-S01	3	1	1					1	
		1430			BRW-SS02-S02	3	1	1	1					
					+ Sf NA									

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
D. [illegible]	8-27-93 1720	[illegible]	[illegible]	8-27-93 1720	Cold Storage
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks:	

ICF KAISER ENGINEERS

CHAIN OF CUSTODY RECORD

NO. 0583

1/2

PROJ. NO. 4096-412-01

PROJECT NAME: DEW Line RI/FS

SAMPLERS: (Signature) [signature]

YR	MO	NO.

STAT. NO.	DATE 1993	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CON-TAINERS	VOC-8260	VPH	VOC-BTEX	EPH				REMARKS
Barrow	9-6	1315		X	BRW-SS02-2S06 (~~AOC2~~)	2	1→			1				
		1345			BRW-SS01-2S04	1				1				
		1350			BRW-SS01-2S05	1				1				
		1355			BRW-SS01-2S06	1				1				
		1400			BRW-SS01-2S07	2	~~1~~	—	1	1				VOC-BTEX + EPH only
		1410			BRW-SS01-2S08	1				1				
		1420			BRW-SS01-2S09	1				1				
		1425			BRW-SS01-2S10	1				1				
		1435			BRW-SS01-2S11	1				1				
		1430			BRW-SS01-2S12	1				1				
		1600			BRW-AOC2-2SD09	2		1→		1				
		1605			BRW-AOC2-2SD10	2		1→		1				
		1600			BRW-AOC2-2S08	2		1	~~→~~	1				VPH + EPH only SF
		1610			BRW-AOC2-2S09	2	1→			1				
		1620			BRW-AOC2-2S10	2	1→			1				
		1615			BRW-AOC2-2S11	2		1		1				

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[signature]	9-6-93 1700	Fed Ex # 4014406505			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks:	

ICF KAISER ENGINEERS

CHAIN OF CUSTODY RECORD

NO. 0584

2 of 2 [illegible]

PROJ. NO.	PROJECT NAME	YR MO NO.
A1096-412-01	DEW Line RI/FS	

SAMPLERS: (Signature) [signature]

STAT. NO.	DATE 1993	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOC-8260	VPH	VOC-BTEX	EPH			REMARKS
Barrow	9-6	1630		X	BRW-AOC2-2S12	2	1	1	[illegible]				[illegible] written in, could be on bottles
		1000			BRW-2TB03	2	2 →	→					on these 2
		1150			BRW-2EB02	3	3 →						

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[signature]	9-6-93 / 1700	Fed EX # 6041406505			
Relinquished by: (Signature)	**Date / Time**	**Received by: (Signature)**	**Relinquished by: (Signature)**	**Date / Time**	**Received by: (Signature)**
Relinquished by: (Signature)	**Date / Time**	**Received for Laboratory by: (Signature)**	**Date / Time**	**Remarks:**	

ICF KAISER ENGINEERS

CHAIN OF CUSTODY RECORD

NO. 0589

PROJ. NO.	PROJECT NAME	YR MO NO.
41096-412-01	DEW Line RI/FS	

SAMPLERS: (Signature) Robert Taaffe, Robert [illegible]

STAT. NO.	DATE 1993	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOC 8260	SVOC 8270	metals	PCB	Pesticides	herbicides	REMARKS
Barrow/Lay	9-56			X	LAY-WØ1	9	3	2	1	1	1	1	[illegible]
Barrow		[illegible]			BRW-TBØ4	2	2						
Lonely		[illegible]			LON-WØ1	13	3	3	1	3	3	3	QA/QC

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Robert Taaffe	9-9-93 1110	Mark Arc			

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)

Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks:

APPENDIX F

ANALYTICAL DATA

1. SUMMARY TABLES OF ANALYTICAL DATA (presented in Sections 3.0 and 4.0)
2. CROSS-REFERENCE TABLE FOR SAMPLE IDENTIFICATION
3. ANALYTICAL DATA (for each site CT&E Data is presented first followed by F&B Data)

1. **SUMMARY TABLES OF ANALYTICAL DATA (presented in Sections 3.0 and 4.0)**

2. CROSS-REFERENCE TABLE FOR SAMPLE IDENTIFICATION

CROSS-REFERENCE SAMPLE IDENTIFICATION

RI/FS TEXT AND TABLE SAMPLE IDENTIFICATION	FIELD CHAIN-OF-CUSTODY AND DATA VALIDATION SAMPLE IDENTIFICATION	SITE IDENTIFICATION	FIELD BATCH IDENTIFICATION		LABORATORY IDENTIFICATION		LABORATORY BATCH IDENTIFICATION		SAMPLE DESCRIPTION
			CT&E	F&B	CT&E	F&B	CT&E	F&B	
Diesel Fuel Spill (SS01)									
BRW-SS01-S01	BRW-SS01-S01	SS01	559	558	93.4424-8	1198	93.4424	#5-08/31/93 #1&2-09/02/93	Soil
BRW-SS01-S02	BRW-SS01-S02	SS01		558		1200		#5-08/31/93 #1&2-09/02/93	Soil
BRW-SS01-S03	BRW-SS01-S03	SS01		558		1202		#5-08/31/93 #1&2-09/02/93	Soil
BRW-SS01-2S04	BRW-SS01-2S04	SS01	583		93.4627-2		93.4627	#5-08/31/93 #1&2-09/02/93	Soil
BRW-SS01-2S05	BRW-SS01-2S05	SS01	583		93.4627-3		93.4627	#5-08/31/93 #1&2-09/02/93	Soil
BRW-SS01-2S06	BRW-SS01-2S06	SS01	583		93.4627-4		93.4627	#5-08/31/93 #1&2-09/02/93	Soil
BRW-SS01-2S07	BRW-SS01-2S07	SS01	583		93.4627-5		93.4627	#5-08/31/93 #1&2-09/02/93	Soil
BRW-SS01-2S08	BRW-SS01-2S08	SS01	583		93.4627-6		93.4627	#5-08/31/93 #1&2-09/02/93	Soil
BRW-SS01-2S09	BRW-SS01-2S09	SS01	583		93.4627-7		93.4627	#5-08/31/93 #1&2-09/02/93	Soil
BRW-SS01-2S10	BRW-SS01-2S10	SS01	583		93.4627-8		93.4627	#5-08/31/93 #1&2-09/02/93	Soil
BRW-SS01-2S11	BRW-SS01-2S11	SS01	583		93.4627-9		93.4627	#5-08/31/93 #1&2-09/02/93	Soil
BRW-SS01-2S12	BRW-SS01-2S12	SS01	583		93.4627-10		93.4627	#5-08/31/93 #1&2-09/02/93	Soil
BRW-SS01-SD01	BRW-SS01-SD01	SS01	559	557	93.4424-7	1136	93.4424	#5-08/31/93 #1&2-09/02/93	Sediment
BRW-SS01-SD02	BRW-SS01-SD02	SS01		557		1138		#5-08/31/93 #1&2-09/02/93	Sediment
BRW-SS01-SD03	BRW-SS01-SD03	SS01		557		1140		#5-08/31/93 #1&2-09/02/93	Sediment

CT&E - Commercial Testing and Engineering Co.
F&B - Friedman and Bruya, Inc.

CROSS-REFERENCE SAMPLE IDENTIFICATION (CONTINUED)

RI/FS TEXT AND TABLE SAMPLE IDENTIFICATION	FIELD CHAIN-OF-CUSTODY AND DATA VALIDATION SAMPLE IDENTIFICATION	SITE IDENTIFICATION	FIELD BATCH IDENTIFICATION		LABORATORY IDENTIFICATION		LABORATORY BATCH IDENTIFICATION		SAMPLE DESCRIPTION
			CT&E	F&B	CT&E	F&B	CT&E	F&B	
Diesel Fuel Spill (SS01) (Continued)									
BRW-SS01-SD04	BRW-SS01-SD04	SS01		557		1142		#5-08/31/93 #1&2-09/02/93	Sediment
BRW-SS01-SD05	BRW-SS01-SD05	SS01		557		1144		#5-08/31/93 #1&2-09/02/93	Sediment
BRW-SS01-SD06	BRW-SS01-SD06	SS01		558		1190		#5-08/31/93 #1&2-09/02/93	Sediment
BRW-SS01-SD07	BRW-SS01-SD07	SS01		558		1192		#5-08/31/93 #1&2-09/02/93	Sediment
BRW-SS01-SD08	BRW-SS01-SD08	SS01		558		1194		#5-08/31/93 #1&2-09/02/93	Sediment
BRW-SS01-SD09	BRW-SS01-SD09	SS01		558		1196		#5-08/31/93 #1&2-09/02/93	Field Replicate Sediment
BRW-SS01-SW01	BRW-SS01-SW01	SS01	559	556	93.4424-6	1160	93.4424	#5-09/01/93 #3&4-09/02/93	Surface Water
BRW-SS01-SW02	BRW-SS01-SW02	SS01		556		1164		#5-09/01/93 #3&4-09/02/93	Surface Water
BRW-SS01-SW03	BRW-SS01-SW03	SS01		556		1170		#5-09/01/93 #3&4-09/02/93	Surface Water
BRW-SS01-SW04	BRW-SS01-SW04	SS01		556		1172 1174		#5-09/01/93 #3&4-09/02/93	Surface Water
BRW-SS01-SW05	BRW-SS01-SW05	SS01		556		1176 1178		#5-09/01/93 #3&4-09/02/93	Surface Water
BRW-SS01-SW06	BRW-SS01-SW06	SS01		556		1180 1182		#5-09/01/93 #3&4-09/02/93	Surface Water
BRW-SS01-SW07	BRW-SS01-SW07	SS01		556 558		1184 1204		#5-09/01/93 #3&4-09/02/93	Surface Water
BRW-SS01-SW08	BRW-SS01-SW08	SS01		556 558		1188		#3&4-09/02/93	Field Duplicate Surface Water

CT&E - Commercial Testing and Engineering Co.
F&B - Friedman and Bruya, Inc.

CROSS-REFERENCE SAMPLE IDENTIFICATION (CONTINUED)

RI/FS TEXT AND TABLE SAMPLE IDENTIFICATION	FIELD CHAIN-OF-CUSTODY AND DATA VALIDATION SAMPLE IDENTIFICATION	SITE IDENTIFICATION	FIELD BATCH IDENTIFICATION		LABORATORY IDENTIFICATION		LABORATORY BATCH IDENTIFICATION		SAMPLE DESCRIPTION
			CT&E	F&B	CT&E	F&B	CT&E	F&B	
Garage (SS02)									
BRW-SS02-S01	BRW-SS02-S01	SS02		557		1148		#5-08/31/93 #1&2-09/02/93	Soil
BRW-SS02-S02	BRW-SS02-S02	SS02	559	557	93.4424-9	1150	93.4424	#5-08/31/93 #1&2-09/02/93	Soil
BRW-SS02-S02	BRW-SS02-S02DP	SS02		557		1150		#5-08/31/93 #1&2-09/02/93	Soil Duplicate
BRW-SS02-S02	BRW-SS02-S02S	SS02		557		1150		#5-08/31/93 #1&2-09/02/93	Soil Spike
BRW-SS02-S02	BRW-SS02-S02SD	SS02		557		1150		#5-08/31/93 #1&2-09/02/93	Soil Spike Duplicate
BRW-SS02-S03	BRW-SS02-S03	SS02		557		1152		#5-08/31/93 #1&2-09/02/93	Soil
BRW-SS02-S04	BRW-SS02-S04	SS02		558		1154		#5-08/31/93 #1&2-09/02/93	Soil
BRW-SS02-S05	BRW-SS02-S05	SS02		558		1206		#5-08/31/93 #1&2-09/02/93	Field Replicate Soil
BRW-SS02-2S06	BRW-SS02-2S06	SS02	583		93.4627-1		93.4627		Soil
BRW-SS02-SD01	BRW-SS02-SD01	SS02		557		1146		#5-08/31/93 #1&2-09/02/93	Sediment

CT&E - Commercial Testing and Engineering Co.
F&B - Friedman and Bruya, Inc.

CROSS-REFERENCE SAMPLE IDENTIFICATION (CONTINUED)

RI/FS TEXT AND TABLE SAMPLE IDENTIFICATION	FIELD CHAIN-OF-CUSTODY AND DATA VALIDATION SAMPLE IDENTIFICATION	SITE IDENTIFICATION	FIELD BATCH IDENTIFICATION		LABORATORY IDENTIFICATION		LABORATORY BATCH IDENTIFICATION		SAMPLE DESCRIPTION
			CT&E	F&B	CT&E	F&B	CT&E	F&B	
Air Terminal Building (SS03)									
BRW-AOC2-S01	BRW-SS03-S01	SS03		557		1122		#5-08/31/93 #1&2-09/02/93	Soil
BRW-AOC2-S02	BRW-SS03-S02	SS03		557		1124		#5-08/31/93 #1&2-09/02/93	Soil
BRW-AOC2-S03	BRW-SS03-S03	SS03		557		1126		#5-08/31/93 #1&2-09/02/93	Soil
BRW-AOC2-S04	BRW-SS03-S04	SS03	559	557	93.4424-1	1128	93.4424	#5-08/31/93 #1&2-09/02/93	Soil
BRW-AOC2-S04	BRW-SS03-S04DP	SS03	559		93.4424-2		93.4424		Soil Duplicate
BRW-AOC2-S04	BRW-SS03-S04S	SS03	559		93.4424-3		93.4424		Soil Spike
BRW-AOC2-S04	BRW-SS03-S04SD	SS03	559		93.4424-10		93.4424		Soil Spike Duplicate
BRW-AOC2-S05	BRW-SS03-S05	SS03		557		1130		#5-08/31/93 #1&2-09/02/93	Soil
BRW-AOC2-S06	BRW-SS03-S06	SS03		557		1132		#5-08/31/93 #1&2-09/02/93	Soil
BRW-AOC2-S06	BRW-SS03-S06DP	SS03		557		1132		#5-08/31-93	Soil Duplicate
BRW-AOC2-S06	BRW-SS03-S06S	SS03		557		1132		#5-08/31-93	Soil Spike
BRW-AOC2-S06	BRW-SS03-S06SD	SS03		557		1132		#5-08/31-93	Soil Spike Duplicate
BRW-AOC2-S07	BRW-SS03-S07	SS03		557		1134			Field Replicate Soil
BRW-AOC2-2S08	BRW-SS03-2S08	SS03	583		93.4627-15		93.4627		Soil
BRW-AOC2-2S09	BRW-SS03-2S09	SS03	583		93.4627-16		93.4627		Soil
BRW-AOC2-2S09	BRW-SS03-2S09S	SS03	583		93.4627-17		93.4627		Soil Spike
BRW-AOC2-2S09	BRW-SS03-2S09SD	SS03	583		93.4627-18		93.4627		Soil Spike Duplicate
BRW-AOC2-2S10	BRW-SS03-2S10	SS03	583		93.4627-19		93.4627		Soil
BRW-AOC2-2S11	BRW-SS03-2S11	SS03	583		93.4627-20		93.4627		Soil
BRW-AOC2-2S12	BRW-SS03-2S12	SS03	584		93.4627-21		93.4627		Field Replicate Soil

CT&E - Commercial Testing and Engineering Co.
F&B - Friedman and Bruya, Inc.

CROSS-REFERENCE SAMPLE IDENTIFICATION (CONTINUED)

RI/FS TEXT AND TABLE SAMPLE IDENTIFICATION	FIELD CHAIN-OF-CUSTODY AND DATA VALIDATION SAMPLE IDENTIFICATION	SITE IDENTIFICATION	FIELD BATCH IDENTIFICATION		LABORATORY IDENTIFICATION		LABORATORY BATCH IDENTIFICATION		SAMPLE DESCRIPTION
			CT&E	F&B	CT&E	F&B	CT&E	F&B	
Air Terminal Building (SS03) (Continued)									
BRW-AOC2-SD01	BRW-SS03-SD01	SS03		551		828		#6-08/28/93 #3-08/28/93 #4-08/29/93	Sediment
BRW-AOC2-SD02	BRW-SS03-SD02	SS03		551		830		#6-08/28/93 #3-08/28/93 #4-08/29/93	Sediment
BRW-AOC2-SD03	BRW-SS03-SD03	SS03		551		832		#6-08/28/98	Sediment
BRW-AOC2-SD04	BRW-SS03-SD04	SS03		551		834		#6-08/28/93 #3-08/28/93 #4-08/29/93	Sediment
BRW-AOC2-SD05	BRW-SS03-SD05	SS03		551		836		#6-08/28/93 #3-08/28/93 #4-08/29/93	Sediment
BRW-AOC2-SD06	BRW-SS03-SD06	SS03		551		838		#6-08/28/93 #3-08/28/93 #4-08/29/93	Sediment
BRW-AOC2-SD07	BRW-SS03-SD07	SS03	549	551	93.4397-8	840	93.4397	#6-08/28/93 #3-08/28/93 #4-08/29/93	Sediment
BRW-AOC2-SD08	BRW-SS03-SD08	SS03	549	551	93.4397-9	842	93.4397	#6-08/28/93 #3-08/28/93 #4-08/29/93	Field Replicate Sediment
BRW-AOC2-2SD09	BRW-SS03-2SD09	SS03	583		93.4627-11		93.4627		Sediment
BRW-AOC2-2SD09	BRW-SS03-2SD09S	SS03	583		93.4627-12		93.4627		Sediment Spike
BRW-AOC2-2SD09	BRW-SS03-2SD09SD	SS03	583		93.4627-13		93.4627		Sediment Spike Duplicate
BRW-AOC2-2SD10	BRW-SS03-2SD10	SS03	583		93.4627-14		93.4627		Sediment
BRW-AOC2-SW01	BRW-SS03-SW01	SS03		552 554		794 843		#5-08/28/93 #1&2-08/28/93	Surface Water
BRW-AOC2-SW02	BRW-SS03-SW02	SS03		552 554		798 844		#5-08/28/93 #1&2-08/28/93	Surface Water
BRW-AOC2-SW03	BRW-SS03-SW03	SS03		552 554		800 845		#5-08/28/93 #1&2-08/28/93	Surface Water

CT&E - Commercial Testing and Engineering Co.
F&B - Friedman and Bruya, Inc.

CROSS-REFERENCE SAMPLE IDENTIFICATION (CONTINUED)

RI/FS TEXT AND TABLE SAMPLE IDENTIFICATION	FIELD CHAIN-OF-CUSTODY AND DATA VALIDATION SAMPLE IDENTIFICATION	SITE IDENTIFICATION	FIELD BATCH IDENTIFICATION		LABORATORY IDENTIFICATION		LABORATORY BATCH IDENTIFICATION		SAMPLE DESCRIPTION
			CT&E	F&B	CT&E	F&B	CT&E	F&B	
Air Terminal Building (SS03) (Continued)									
BRW-AOC2-SW04	BRW-SS03-SW04	SS03	550 555	552 554	93.4395-7 93.4396-1	804 846	93.4395 93.4396	#5-08/28/93 #1&2-08/28/93	Surface Water
BRW-AOC2-SW05	BRW-SS03-SW05	SS03		552 554		806 847		#5-08/28/93 #1&2-08/28/93	Surface Water
BRW-AOC2-SW06	BRW-SS03-SW06	SS03		552 554		810 848		#5-08/28/93 #1&2-08/28/93	Surface Water
BRW-AOC2-SW07	BRW-SS03-SW07	SS03	550 555	552 554	93.4395-8 93.4396-2	812 849	93.4395 93.4396	#5-08/28/93 #1&2-08/25/93 or #3&4-08/09/93	Surface Water
BRW-AOC2-SW08	BRW-SS03-SW08	SS03	550 553 555	552 554	93.4396-3 93.4394-4 93.4395-9	814 850	93.4394 93.4395 93.4396	#5-08/28/93 #1&2-08/28/93	Field Duplicate Surface Water

CT&E - Commercial Testing and Engineering Co.
F&B - Friedman and Bruya, Inc.

CROSS-REFERENCE SAMPLE IDENTIFICATION (CONTINUED)

RI/FS TEXT AND TABLE SAMPLE IDENTIFICATION	FIELD CHAIN-OF-CUSTODY AND DATA VALIDATION SAMPLE IDENTIFICATION	SITE IDENTIFICATION	FIELD BATCH IDENTIFICATION		LABORATORY IDENTIFICATION		LABORATORY BATCH IDENTIFICATION		SAMPLE DESCRIPTION
			CT&E	F&B	CT&E	F&B	CT&E	F&B	
Background (BKGD)									
BRW-BKGD-S01	BRW-BKGD-S01	BKGD	549	551	93.4397-4	820	93.4397	#6-08/28/93 #3-08/28/93 #4-08/29/93	Soil
BRW-BKGD-S02	BRW-BKGD-S02	BKGD	549	551	93.4397-5	822	93.4397	#6-08/28/93 #3-08/28/93 #4-08/29/93	Soil
BRW-BKGD-S03	BRW-BKGD-S03	BKGD	549	551	93.4397-6	824	93.4397	#6-08/28/93 #3-08/28/93 #4-08/29/93	Soil
BRW-BKGD-S04	BRW-BKGD-S04	BKGD	549	551	93.4397-7	826	93.4397	#6-08/28/93 #3-08/28/93 #4-08/29/93	Soil
BRW-BKGD-SD01	BRW-BKGD-SD01	BKGD	549	551	93.4397-1	818	93.4397	#6-08/28/93 #3-08/28/93 #4-08/29/93	Sediment
BRW-BKGD-SD01	BRW-BKGD-SD01DP	BKGD	549		93.4397-3		93.4397		Sediment Duplicate
BRW-BKGD-SD01	BRW-BKGD-SD01S	BKGD	549		93.4397-2		93.4397		Sediment Spike
BRW-BKGD-SD01	BRW-BKGD-SD01SD	BKGD	549		93.4397-10		93.4397		Sediment Spike Duplicate
BRW-BKGD-SW01	BRW-BKGD-SW01	BKGD	550	552	93.4395-3	778 780	93.4395	#5-09/01/93 #1&2-08/25/93	Surface Water
BRW-BKGD-SW01	BRW-BKGD-SW01DP	BKGD	550		93.4395-5		93.4395		Surface Water Duplicate
BRW-BKGD-SW01	BRW-BKGD-SW01S	BKGD	550		93.4395-4		93.4395		Surface Water Spike
BRW-BKGD-SW02	BRW-BKGD-SW02	BKGD	553 550	552	93.4394-1 93.4395-6	784 786	93.4394 93.4395	#5-09/01/93 #1&2-08/25/93	Surface Water
BRW-BKGD-SW02	BRW-BKGD-SW02DP	BKGD	553		93.4394-2		93.4394		Surface Water Duplicate
BRW-BKGD-SW02	BRW-BKGD-SW02S	BKGD	553		93.4394-3		93.4394		Surface Water Spike
BRW-BKGD-SW02	BRW-BKGD-SW02SD	BKGD	553		93.4394-5		93.4394		Surface Water Spike Duplicate

CT&E - Commercial Testing and Engineering Co.
F&B - Friedman and Bruya, Inc.

CROSS-REFERENCE SAMPLE IDENTIFICATION (CONTINUED)

RI/FS TEXT AND TABLE SAMPLE IDENTIFICATION	FIELD CHAIN-OF-CUSTODY AND DATA VALIDATION SAMPLE IDENTIFICATION	SITE IDENTIFICATION	FIELD BATCH IDENTIFICATION		LABORATORY IDENTIFICATION		LABORATORY BATCH IDENTIFICATION		SAMPLE DESCRIPTION
			CT&E	F&B	CT&E	F&B	CT&E	F&B	
Quality Assurance Samples									
BRW-AB01	BRW-AB01	QA/QC	550		93.4395-2		93.4395		Ambient Blank
BRW-EB01	BRW-EB01	QA/QC	559	556	93.4424-4	1156 1158	93.4424	#5-09/01/93 #3&4-09/02/93	Equipment Blank
BRW-2EB02	BRW-2EB02	QA/QC	584		93.4627-23		93.4627		Equipment Blank
BRW-TB01	BRW-TB01	QA/QC	550	552	93.4395-1	776	93.4395	#1&2-08/25/93	Trip Blank
BRW-TB02	BRW-TB02	QA/QC	559	556	93.4425-5	1154	93.4425	#5-08/31/93	Trip Blank
BRW-2TB03	BRW-2TB03	QA/QC	584		93.4627-22		93.4627		Trip Blank
BRW-TB04	BRW-2TB04	QA/QC	589		93.4696-1		93.4696		Trip Blank

CT&E - Commercial Testing and Engineering Co.
F&B - Friedman and Bruya, Inc.

3. ANALYTICAL DATA

ANALYTICAL DATA SHEETS FOR THE DIESEL FUEL SPILL (SS01)

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

Chemlab Ref.# :93.4424-8
Client Sample ID :BRW-SS01-S01 BARROW
Matrix :SOIL

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70209
Report Completed :11/02/93
Collected :08/27/93 @ 13:15 hrs
Received :08/29/93 @ 12:45 hrs
Technical Director:STEPHEN C. EDE
Released By : C. Umestead

Sample Remarks: SAMPLE COLLECTED BY: D. NOE AND ROBERT C.C. B = THIS FLAG IS USED WHEN THE ANALYTE IS FOUND IN THE ASSOCIATED BLANK AS WELL AS IN THE SAMPLE.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Volatile Organics				EPA 8260				
Benzene	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Bromobenzene	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Bromochloromethane	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Bromodichloromethane	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Bromoform	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Bromomethane	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
n-Butylbenzene	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
sec-Butylbenzene	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
tert-Butylbenzne	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Carbon Tetrachloride	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Chlorobenzene	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Chloroethane	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Chloroform	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Chloromethane	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
2-Chlorotoluene	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
4-Chlorotoluene	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Dibromochloromethane	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
12Dibromo3Chloropropane	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,2-Dibromoethane	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Dibromomethane	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,2-Dichlorobenzene	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,3-Dichlorobenzene	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,4-Dichlorobenzene	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Dichlorodifluoromethane	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,1-Dichloroethane	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,2-Dichloroethane	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,1-Dichloroethene	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
cis-1,2-Dichloroethene	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
trans1,2-Dichloroethene	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,2-Dichloropropane	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,3-Dichloropropane	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
2,2-Dichloropropane	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,1-Dichloropropene	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Ethylbenzene	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Hexachlorobutadiene	0.350	U	mg/Kg	EPA 8260		08/30	09/05	KWM

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES
SINCE 1909

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4424-8
Client Sample ID :BRW-SS01-S01 BARROW
Matrix :SOIL

Isopropylbenzene	0.350	U	mg/Kg	EPA 8260	08/30	09/05	KWM
p-Isopropyltoluene	0.350	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Methylene Chloride	0.350	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Napthalene	0.350	U	mg/Kg	EPA 8260	08/30	09/05	KWM
n-Propylbenzene	0.350	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Styrene	0.350	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1112-Tetrachloroethane	0.350	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1122-Tetrachloroethane	0.350	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Tetrachloroethene	0.350	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Toluene	0.350	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,2,3-Trichlorobenzene	0.350	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,2,4-Trichlorobenzene	0.350	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,1,1-Trichloroethane	0.350	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,1,2-Trichloroethane	0.350	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Trichloroethene	0.350	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Trichlorofluoromethane	0.350	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,2,3-Trichloropropane	0.350	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,2,4-Trimethylbenzene	0.903		mg/Kg	EPA 8260	08/30	09/05	KWM
1,3,5-Trimethylbenzene	0.396		mg/Kg	EPA 8260	08/30	09/05	KWM
Vinyl Chloride	0.350	U	mg/Kg	EPA 8260	08/30	09/05	KWM
p+m-Xylene	0.350	U	mg/Kg	EPA 8260	08/30	09/05	KWM
o-Xylene	0.350	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Semivolatile Organics				EPA 8270			
Phenol	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
bis(2-Chloroethyl)ether	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
2-Chlorophenol	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
1,3-Dichlorobenzene	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
1,4-Dichlorobenzene	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
Benzyl Alcohol	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
1,2-Dichlorobenzene	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
2-Methylphenol	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
bis(2-Chloroisopropyl)e	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
4-Methylphenol	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
n-Nitroso-di-n-Propylam	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
Hexachloroethane	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
Nitrobenzene	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
Isophorone	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
2-Nitrophenol	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
2,4-Dimethylphenol	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
Benzoic Acid	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
bis(2-Chloroethoxy)Meth	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
2,4-Dichlorophenol	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
1,2,4-Trichlorobenzene	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
Naphthalene	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
4-Chloroaniline	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
Hexachlorobutadiene	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
4-Chloro-3-Methylphenol	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
2-Methylnaphthalene	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
Hexachlorocyclopentadie	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
2,4,6-Trichlorophenol	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV

COMMERCIAL TESTING & ENGINEERING CO.

ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4424-8
Client Sample ID :BRW-SS01-S01 BARROW
Matrix :SOIL

2,4,5-Trichlorophenol	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
2-Chloronaphthalene	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
2-Nitroaniline	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
Dimethylphthalate	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
Acenaphthylene	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
2,6-Dinitrotoluene	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
3-Nitroaniline	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
Acenaphthene	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
2,4-Dinitrophenol	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
4-Nitrophenol	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
Dibenzofuran	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
2,4-Dinitrotoluene	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
Diethylphthalate	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
4-Chlorophenyl-Phenylet	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
Fluorene	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
4-Nitroaniline	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
4,6-Dinitro-2-Methylphe	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
n-Nitrosodiphenylamine	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
4-Bromophenyl-Phenyleth	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
Hexachlorobenzene	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
Pentachlorophenol	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
Phenanthrene	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
Anthracene	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
di-n-Butylphthalate	20.1	B	mg/Kg	EPA 8270	09/10	10/14	GV
Fluoranthene	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
Pyrene	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
Butylbenzylphthalate	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
3,3-Dichlorobenzidine	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
Benzo(a)Anthracene	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
Chrysene	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
bis(2-Ethylhexyl)Phthal	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
di-n-Octylphthalate	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
Benzo(b)Fluoranthene	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
Benzo(k)Fluoranthene	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
Benzo(a)Pyrene	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
Indeno(1,2,3-cd)Pyrene	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
Dibenz(a,h)Anthracene	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
Benzo(g,h,i)Perylene	9.30	U	mg/Kg	EPA 8270	09/10	10/14	GV
TOC, Soil	53800		mg/Kg	PSEP Ref Lab			

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* See Special Instructions Above
See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES
SINCE 1908

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4627-2
Client Sample ID :BRW-SS01-2S04 BARROW
Matrix :SOIL

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70637
Report Completed :10/05/93
Collected :09/06/93 @ 13:45 hrs.
Received :09/07/93 @ 11:00 hrs.
Technical Director:STEPHEN C. EDE
Released By : C. Homestead

Sample Remarks: SAMPLE COLLECTED BY: S.M. AND J.P. 102 MG/KG OF PATTERN IS NOT CONSISTENT WITH MIDDLE DISTILLATE FUEL.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Percent Solids	96.5		%	SM17 2540G			09/14	EAL
Hydrocarbons EPH	596	D	mg/Kg	3510/3550/8100M		09/14	09/17	DRS

* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

SINCE 1908

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4627-3
Client Sample ID :BRW-SS01-2S05 BARROW
Matrix :SOIL

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70637
Report Completed :10/05/93
Collected :09/06/93 @ 13:50 hrs.
Received :09/07/93 @ 11:00 hrs.
Technical Director:STEPHEN C. EDE
Released By : C. Homestead

Sample Remarks: SAMPLE COLLECTED BY: S.M. AND J.P.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Percent Solids	92.0		%	SM17 2540G			09/14	EAL
Hydrocarbons EPH	3960	D	mg/Kg	3510/3550/8100M		09/14	09/17	DRS

* See Special Instructions Above
\# See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

SINCE 1976

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4627-4
Client Sample ID :BRW-SS01-2S06 BARROW
Matrix :SOIL

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70637
Report Completed :10/05/93
Collected :09/06/93 @ 13:55 hrs.
Received :09/07/93 @ 11:00 hrs.
Technical Director:STEPHEN C. EDE
Released By : C. Homestead

Sample Remarks: SAMPLE COLLECTED BY: S.M. AND J.P. 12.3 MG/KG IS NOT CONSISTENT WITH MIDDLE DISTILLATE FUEL.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Percent Solids	92.9		%	SM17 2540G			09/14	EAL
Hydrocarbons EPH	15.4		mg/Kg	3510/3550/8100M		09/14	09/16	JBH

* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

SINCE 1908

REPORT of ANALYSIS

5633 B STREE
ANCHORAGE, AK 9951
TEL: (907) 562-234
FAX: (907) 561-530

Chemlab Ref.# :93.4627-5
Client Sample ID :BRW-SS01-2S07 BARROW
Matrix :SOIL

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70637
Report Completed :10/05/93
Collected :09/06/93 @ 14:00 h
Received :09/07/93 @ 11:00 h
Technical Director:STEPHEN C. EDE
Released By : C. Homestead

Sample Remarks: SAMPLE COLLECTED BY: S.M. AND J.P.

Qualifier/Comments

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	In
Percent Solids	82.9		%	SM17 2540G			09/04	E
Hydrocarbons EPH	2210	D	mg/Kg	3510/3550/8100M		09/14	09/17	D
Aromatic Volatiles				EPA 8020				
Benzene	0.025	U	mg/Kg	EPA 8020		09/08	09/17	J
Toluene	0.082		mg/Kg	EPA 8020 (N) - K.1		09/08	09/17	J
Ethylbenzene	0.208		mg/Kg	EPA 8020 (N) - K.1		09/08	09/17	J
Chlorobenzene	0.025	U	mg/Kg	EPA 8020		09/08	09/17	J
p & m Xylene	0.198		mg/Kg	EPA 8020 (N) - K.1		09/08	09/17	J
o-Xylene	0.572		mg/Kg	EPA 8020 (N) - K.1		09/08	09/17	J
1,4 Dichlorobenzene	0.025	U	mg/Kg	EPA 8020		09/08	09/17	J
1,3 Dichlorobenzene	0.025	U	mg/Kg	EPA 8020		09/08	09/17	J
1,2 Dichlorobenzene	0.025	U	mg/Kg	EPA 8020		09/08	09/17	J

3-4-94

* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.

ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4627-6
Client Sample ID :BRW-SS01-2S08 BARROW
Matrix :SOIL

Client Name	:ICF KAISER ENGINEERING	WORK Order	:70637
Ordered By	:RAY MORRIS	Report Completed	:10/05/93
Project Name	:DEW LINE RI/FS BARROW	Collected	:09/06/93 @ 14:10 hrs.
Project#	:41096-412-01	Received	:09/07/93 @ 11:00 hrs.
PWSID	:UA	Technical Director	:STEPHEN C. EDE
		Released By	: C. Homestead

Sample Remarks: SAMPLE COLLECTED BY: S.M. AND J.P. 53.0 MG/KG OF PATTERN IS NOT CONSISTENT WITH MIDDLE DISTILLATE FUEL.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Percent Solids	93.5		%	SM17 2540G			09/14	EAL
Hydrocarbons EPH	416		mg/Kg	3510/3550/8100M		09/14	09/16	JBH

* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES
CE 1908

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4627-7
Client Sample ID :BRW-SS01-2S09 BARROW
Matrix :SOIL

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70637
Report Completed :10/05/93
Collected :09/06/93 @ 14:20 hrs.
Received :09/07/93 @ 11:00 hrs.
Technical Director:STEPHEN C. EDE
Released By : C. Homestead

Sample Remarks: SAMPLE COLLECTED BY: S.M. AND J.P. 15.6 MG/KG OF PATTERN IS NOT CONSISTENT WITH MIDDLE DISTILLATE FUEL.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Percent Solids	94.7		%	SM17 2540G			09/14	EAL
Hydrocarbons EPH	26.2		mg/Kg	3510/3550/8100M		09/14	09/22	JBH

* = See Special Instructions Above
See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.

ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

Chemlab Ref.# :93.4627-8
Client Sample ID :BRW-SS01-2S10 BARROW
Matrix :SOIL

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70637
Report Completed :10/05/93
Collected :09/06/93 @ 14:25 hrs.
Received :09/07/93 @ 11:00 hrs.
Technical Director:STEPHEN C. EDE
Released By : C. Homestead

Sample Remarks: SAMPLE COLLECTED BY: S.M. AND J.P. 8.99 MG/KG OF PATTERN IS NOT CONSISTENT WITH MIDDLE DISTILLATE FUEL.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Percent Solids	90.4		%	SM17 2540G			09/14	EAL
Hydrocarbons EPH	13.6		mg/Kg	3510/3550/8100M		09/14	09/22	JBH

* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.

ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4627-9
Client Sample ID :BRW-SS01-2S11 BARROW
Matrix :SOIL

Client Name	:ICF KAISER ENGINEERING	WORK Order	:70637
Ordered By	:RAY MORRIS	Report Completed	:10/05/93
Project Name	:DEW LINE RI/FS BARROW	Collected	:09/06/93 @ 14:35 hrs.
Project#	:41096-412-01	Received	:09/07/93 @ 11:00 hrs.
PWSID	:UA	Technical Director	:STEPHEN C. EDE
		Released By	: C. Homestead

Sample Remarks: SAMPLE COLLECTED BY: S.M. AND J.P. PATTERN IS NOT CONSISTENT WITH MIDDLE DISTILLATE FUEL.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Percent Solids	92.1		%	SM17 2540G			09/14	EAL
Hydrocarbons EPH	21.9		mg/Kg	3510/3550/8100M		09/14	09/22	JBH

* See Special Instructions Above
See Sample Remarks Above
Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

Chemlab Ref.# :93.4627-10
Client Sample ID :BRW-SS01-2S12 BARROW
Matrix :SOIL

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70637
Report Completed :10/05/93
Collected :09/06/93 @ 14:30 hrs.
Received :09/07/93 @ 11:00 hrs.
Technical Director:STEPHEN C. EDE
Released By : [signature]

Sample Remarks: SAMPLE COLLECTED BY: S.M. AND J.P. PATTERN IS NOT CONSISTENT WITH MIDDLE DISTILLATE FUEL.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Percent Solids	86.6		%	SM17 2540G			09/14	EAL
Hydrocarbons EPH	13.1		mg/Kg	3510/3550/8100M		09/14	09/17	DRS

* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.

ENVIRONMENTAL LABORATORY SERVICES

SINCE 1908

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4424-7
Client Sample ID :BRW-SS01-SD01 BARROW
Matrix :SOIL

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70209
Report Completed :11/02/93
Collected :08/27/93 @ 13:20 hrs
Received :08/29/93 @ 12:45 hrs
Technical Director:STEPHEN C. EDE
Released By : C. Hornstead

Sample Remarks: SAMPLE COLLECTED BY: D. NOE AND ROBERT C.C. B = THIS FLAG IS USED WHEN THE ANALYTE IS FOUND IN THE ASSOCIATED BLANK AS WELL AS IN THE SAMPLE.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Volatile Organics				EPA 8260				
Benzene	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Bromobenzene	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Bromochloromethane	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Bromodichloromethane	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Bromoform	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Bromomethane	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
n-Butylbenzene	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
sec-Butylbenzene	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
tert-Butylbenzne	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Carbon Tetrachloride	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Chlorobenzene	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Chloroethane	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Chloroform	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Chloromethane	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
2-Chlorotoluene	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
4-Chlorotoluene	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Dibromochloromethane	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
12Dibromo3Chloropropane	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,2-Dibromoethane	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Dibromomethane	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,2-Dichlorobenzene	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,3-Dichlorobenzene	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,4-Dichlorobenzene	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Dichlorodifluoromethane	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,1-Dichloroethane	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,2-Dichloroethane	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,1-Dichloroethene	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
cis-1,2-Dichloroethene	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
trans1,2-Dichloroethene	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,2-Dichloropropane	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,3-Dichloropropane	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
2,2-Dichloropropane	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,1-Dichloropropene	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Ethylbenzene	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Hexachlorobutadiene	0.250	U	mg/Kg	EPA 8260		08/30	09/05	KWM

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES
SINCE 1908

REPORT of ANALYSIS

Chemlab Ref.# :93.4424-7
Client Sample ID :BRW-SS01-SD01 BARROW
Matrix :SOIL

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Isopropylbenzene	0.250	U	mg/Kg	EPA 8260	08/30	09/05	KWM
p-Isopropyltoluene	0.250	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Methylene Chloride	0.250	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Napthalene	0.250	U	mg/Kg	EPA 8260	08/30	09/05	KWM
n-Propylbenzene	0.250	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Styrene	0.250	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1112-Tetrachloroethane	0.250	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1122-Tetrachloroethane	0.250	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Tetrachloroethene	0.250	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Toluene	0.250	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,2,3-Trichlorobenzene	0.250	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,2,4-Trichlorobenzene	0.250	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,1,1-Trichloroethane	0.250	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,1,2-Trichloroethane	0.250	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Trichloroethene	0.250	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Trichlorofluoromethane	0.250	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,2,3-Trichloropropane	0.250	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,2,4-Trimethylbenzene	0.250	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,3,5-Trimethylbenzene	0.250	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Vinyl Chloride	0.250	U	mg/Kg	EPA 8260	08/30	09/05	KWM
p+m-Xylene	0.250	U	mg/Kg	EPA 8260	08/30	09/05	KWM
o-Xylene	0.250	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Semivolatile Organics				EPA 8270			
Phenol	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
bis(2-Chloroethyl)ether	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
2-Chlorophenol	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
1,3-Dichlorobenzene	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
1,4-Dichlorobenzene	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
Benzyl Alcohol	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
1,2-Dichlorobenzene	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
2-Methylphenol	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
bis(2-Chloroisopropyl)e	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
4-Methylphenol	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
n-Nitroso-di-n-Propylam	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
Hexachloroethane	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
Nitrobenzene	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
Isophorone	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
2-Nitrophenol	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
2,4-Dimethylphenol	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
Benzoic Acid	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
bis(2-Chloroethoxy)Meth	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
2,4-Dichlorophenol	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
1,2,4-Trichlorobenzene	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
Naphthalene	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
4-Chloroaniline	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
Hexachlorobutadiene	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
4-Chloro-3-Methylphenol	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
2-Methylnaphthalene	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
Hexachlorocyclopentadie	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
2,4,6-Trichlorophenol	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV

COMMERCIAL TESTING & ENGINEERING CO.

ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4424-7
Client Sample ID :BRW-SS01-SD01 BARROW
Matrix :SOIL

2,4,5-Trichlorophenol	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
2-Chloronaphthalene	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
2-Nitroaniline	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
Dimethylphthalate	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
Acenaphthylene	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
2,6-Dinitrotoluene	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
3-Nitroaniline	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
Acenaphthene	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
2,4-Dinitrophenol	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
4-Nitrophenol	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
Dibenzofuran	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
2,4-Dinitrotoluene	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
Diethylphthalate	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
4-Chlorophenyl-Phenylet	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
Fluorene	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
4-Nitroaniline	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
4,6-Dinitro-2-Methylphe	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
n-Nitrosodiphenylamine	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
4-Bromophenyl-Phenyleth	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
Hexachlorobenzene	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
Pentachlorophenol	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
Phenanthrene	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
Anthracene	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
di-n-Butylphthalate	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
Fluoranthene	5.19	B	mg/Kg	EPA 8270	09/10	10/14	GV
Pyrene	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
Butylbenzylphthalate	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
3,3-Dichlorobenzidine	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
Benzo(a)Anthracene	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
Chrysene	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
bis(2-Ethylhexyl)Phthal	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
di-n-Octylphthalate	3.42	B	mg/Kg	EPA 8270	09/10	10/14	GV
Benzo(b)Fluoranthene	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
Benzo(k)Fluoranthene	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
Benzo(a)Pyrene	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
Indeno(1,2,3-cd)Pyrene	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
Dibenz(a,h)Anthracene	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV
Benzo(g,h,i)Perylene	2.40	U	mg/Kg	EPA 8270	09/10	10/14	GV

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* See Special Instructions Above
See Sample Remarks Above
= Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4424-6
Client Sample ID :BRW-SS01-SW01 BARROW
Matrix :WATER

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70209
Report Completed :11/02/93
Collected :08/27/93 @ 13:15 hrs
Received :08/29/93 @ 12:45 hrs
Technical Director:STEPHEN C. EDE
Released By : C. Homestead

Sample Remarks: SAMPLE COLLECTED BY: D. NOE AND ROBERT C.C. 8270 HOLDING TIME WAS EXCEEDED, SAMPLE NOT ANALYZED AS PER CLIENT.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Volatile Organics				EPA 8260				
Benzene	0.0035		mg/L	EPA 8260		09/03	09/03	KWM
Bromobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Bromochloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Bromodichloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Bromoform	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Bromomethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
n-Butylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
sec-Butylbenzene	0.0015		mg/L	EPA 8260		09/03	09/03	[illegible]
tert-Butylbenzne	0.0010	U	mg/L	EPA 8260		09/03	09/03	[illegible]
Carbon Tetrachloride	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Chlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Chloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Chloroform	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Chloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
2-Chlorotoluene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
4-Chlorotoluene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Dibromochloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
12Dibromo3Chloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,2-Dibromoethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Dibromomethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,2-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,3-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,4-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Dichlorodifluoromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,1-Dichloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,2-Dichloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,1-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
cis-1,2-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
trans1,2-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,2-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,3-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
2,2-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,1-Dichloropropene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Ethylbenzene	0.013		mg/L	EPA 8260		09/03	09/03	KWM
Hexachlorobutadiene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Isopropylbenzene	0.0048		mg/L	EPA 8260		09/03	09/03	[illegible]

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES
SINCE 1908

REPORT of ANALYSIS

Chemlab Ref.# :93.4424-6
Client Sample ID :BRW-SS01-SW01 BARROW
Matrix :WATER

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

p-Isopropyltoluene	0.0040		mg/L	EPA 8260		09/03	09/03	KWM
Methylene Chloride	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Napthalene	0.058		mg/L	EPA 8260		09/03	09/03	KWM
n-Propylbenzene	0.0041		mg/L	EPA 8260		09/03	09/03	KWM
Styrene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1112-Tetrachloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1122-Tetrachloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Tetrachloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Toluene	0.028		mg/L	EPA 8260		09/03	09/03	KWM
1,2,3-Trichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,2,4-Trichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,1,1-Trichloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,1,2-Trichloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Trichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Trichlorofluoromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,2,3-Trichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,2,4-Trimethylbenzene	0.092		mg/L	EPA 8260		09/03	09/03	KWM
1,3,5-Trimethylbenzene	0.052		mg/L	EPA 8260		09/03	09/03	KWM
Vinyl Chloride	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
p+m-Xylene	156	D	mg/L	EPA 8260		09/08	09/08	KWM
o-Xylene	156	D	mg/L	EPA 8260		09/08	09/08	KWM
TOC, Nonpurgable				EPA 9060	n/a			
...TOC Range	40.8-45.3		mg/L	EPA 9060			09/08	CMR
...TOC Concentration	43.6		mg/L	EPA 9060			09/08	CMR
Residue, Non-Filterable	90		mg/L	EPA 160.2		09/02	09/02	GPP
Residue,Filterable(TDS)	586		mg/L	EPA 160.1	500	09/03	09/07	RJK

==

* See Special Instructions Above
See Sample Remarks Above
Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

Compiled by SGM 9-15-95

ICF ID	BRW-SS01-S01	BRW-SS01-S02	BRW-SS01-S03
F&BI Number	1198	1200	1202
Sample Type	soil	soil	soil
Date Received	8/27/93	8/27/93	8/27/93
% Dry Weight	82	50	62
Sequence Date	#5-08/31/93	#5-08/31/93	#5-08/31/93
Leaded Gas			
JP-4	<60	<100	<80
Lube Oil	<120	<200	<160
Diesel	510 J	<100	<80
Spike Level			
Unknown Semi-volatile			
Pentacosane	77	73	76
Sequence Date			
PCB 1221			
PCB 1232			
PCB 1016			
PCB 1242			
PCB 1248			
PCB 1254			
PCB 1260			
Spike Level			
Dibutyl Chlorendate			
Sequence Date			
alpha-BHC			
beta-BHC			
gamma-BHC			
delta-BHC			
Heptachlor			
Aldrin			
Heptachlor Epoxide			
Endosulfan I			
DDE			
Dieldrin			
Endrin			
Endosulfan II			
DDD			
Endrin Aldehyde			
DDT			
Endosulfan Sulfate			
Endrin Ketone			
Methoxy Chlor			
Chlordane			
Dibutyl Chlorendate			
Spike Level			
Vol Sequence	#1&2-09/02/93	#1&2-09/02/93	#1&2-09/02/93
CCl4	<0.02	<0.04	<0.03
TCA	<0.02	<0.04	<0.03
Benzene	0.15 J	<0.04	<0.03
TCE	<0.02	<0.04	<0.03
Toluene	1.5	0.4	0.1 possible carryover R
PCE	1.3	<0.02	<0.03
Ethylbenzene	3.7	<0.02	<0.03
Xylenes	~~8~~ 14 J	<0.04	<0.06
Gasoline	210 diesel J	<1 J	<1 J
Spike level			
BFB	104	101	103

Compiled by sgm 9-15-95

ICF ID	BRW-SS01-SD01	BRW-SS01-SD02	BRW-SS01-SD03
F&BI Number	1136	1138	1140
Sample Type	soil	soil	soil
Date Received	8/27/93	8/27/93	8/27/93
% Dry Weight	81	81	77
Sequence Date	#5-08/31/93	#5-08/31/93	#5-08/31/93
Leaded Gas			
JP-4	<60	70	<60
Lube Oil	<120	<120	<120
Diesel	<60	70 J	<60
Spike Level			
Unknown Semi-vola			
Pentacosane	101	83	87
Sequence Date			
PCB 1221			
PCB 1232			
PCB 1016			
PCB 1242			
PCB 1248			
PCB 1254			
PCB 1260			
Spike Level			
Dibutyl Chlorendate			
Sequence Date	#5-08/31/93		
alpha-BHC	<0.01		
beta-BHC	<0.01		
gamma-BHC	<0.01		
delta-BHC	<0.01		
Heptachlor	<0.01		
Aldrin	<0.01		
Heptachlor Epoxide	<0.01		
Endosulfan I	<0.01		
DDE	<0.01		
Dieldrin	<0.01		
Endrin	<0.01		
Endosulfan II	<0.01		
DDD	<0.01		
Endrin Aldehyde	<0.01		
DDT	<0.01		
Endosulfan Sulfate	~~0.02~~ <0.01		
Endrin Ketone	<0.01		
Methoxy Chlor	<~~0.1~~ R		
Chlordane	<0.5 R		
Dibutyl Chlorendate	96		
Spike Level			
Vol Sequence	#1&2-09/02/93	#1&2-09/02/93	#1&2-09/02/93
CCl4	~~0.1~~ <0.02	<0.02	<0.02
TCA	<0.02	<0.02	<0.02
Benzene	~~0.08~~ <0.02	0.17 J	<0.02
TCE	0.2	<0.02	<0.02
Toluene	0.2	0.43	<0.02
PCE	~~6.4~~ <0.02	<0.02	<0.02
Ethylbenzene	0.8	1.2	<0.02
Xylenes	0.8 J	2.1 J	<0.04
Gasoline	~~<1~~ 12 J	15 diesel J	<1 J
Spike level			
BFB	93	78	101

Compiled by SGM 9-15-93

ICF ID	BRW-SS01-SD04	BRW-SS01-SD05	BRW-SS01-SD06
F&BI Number	1142	1144	1190
Sample Type	soil	soil	soil
Date Received	8/27/93	8/27/93	8/27/93
% Dry Weight	79	84	81
Sequence Date	#5-08/31/93	#5-08/31/93	#5-08/31/93
Leaded Gas			
JP-4	<60	<60	<60
Lube Oil	<120	<120	<120
Diesel	<60	<60	<60
Spike Level			
Unknown Semi-vola			
Pentacosane	110	83	66
Sequence Date			
PCB 1221			
PCB 1232			
PCB 1016			
PCB 1242			
PCB 1248			
PCB 1254			
PCB 1260			
Spike Level			
Dibutyl Chlorendate			
Sequence Date			
alpha-BHC			
beta-BHC			
gamma-BHC			
delta-BHC			
Heptachlor			
Aldrin			
Heptachlor Epoxide			
Endosulfan I			
DDE			
Dieldrin			
Endrin			
Endosulfan II			
DDD			
Endrin Aldehyde			
DDT			
Endosulfan Sulfate			
Endrin Ketone			
Methoxy Chlor			
Chlordane			
Dibutyl Chlorendate			
Spike Level			
Vol Sequence	#1&2-09/02/93	#1&2-09/02/93	#1&2-09/02/93
CCl4	<0.02	<0.02	<0.02
TCA	<0.02	<0.02	<0.02
Benzene	<0.02	<0.02	<0.02
TCE	<0.02	<0.02	<0.02
Toluene	0.08	<0.02	<0.02
PCE	<0.02	<0.02	<0.02
Ethylbenzene	0.66	<0.02	<0.02
Xylenes	3.5 J	<0.04	<0.04
Gasoline	~~51~~ 14J	~~23~~ diesel 28J	30 possible carryover of diesel R
Spike level			
BFB	97	95	98

ICF ID	BRW-SS01-SD07	BRW-SS01-SD08	BRW-SS01-SD09
F&BI Number	1192	1194	1196
Sample Type	soil	soil	soil
Date Received	8/27/93	8/27/93	8/27/93
% Dry Weight	80	85	83
Sequence Date	#5-08/31/93	#5-08/31/93	#5-08/31/93
Leaded Gas			
JP-4	<60	<60	<60
Lube Oil	<120	<120	<120
Diesel	<60	<60	<60
Spike Level			
Unknown Semi-vola			
Pentacosane	66	70	120
Sequence Date			
PCB 1221			
PCB 1232			
PCB 1016			
PCB 1242			
PCB 1248			
PCB 1254			
PCB 1260			
Spike Level			
Dibutyl Chlorendate			
Sequence Date			
alpha-BHC			
beta-BHC			
gamma-BHC			
delta-BHC			
Heptachlor			
Aldrin			
Heptachlor Epoxide			
Endosulfan I			
DDE			
Dieldrin			
Endrin			
Endosulfan II			
DDD			
Endrin Aldehyde			
DDT			
Endosulfan Sulfate			
Endrin Ketone			
Methoxy Chlor			
Chlordane			
Dibutyl Chlorendate			
Spike Level			
Vol Sequence	#1&2-09/02/93	#1&2-09/02/93	#1&2-09/02/93
CCl4	<0.02	<0.02	<0.02
TCA	<0.02	<0.02	<0.02
Benzene	<0.02	<0.02	<0.02
TCE	<0.02	<0.02	<0.02
Toluene	<0.02	<0.02	<0.02
PCE	<0.02	<0.02	<0.02
Ethylbenzene	<0.02	<0.02	<0.02
Xylenes	<0.04	<0.04	<0.04
Gasoline	<1 J	<1 J	<1 J
Spike level			
BFB	94	95	93

Compiled by sqm 9-15-95

Compiled by sgm 9-15-93

ICF ID	BRW-SS01-SW01	BRW-SS01-SW01	BRW-SS01-SW02
F&BI Number	1160	1162	1164
Sample Type	water	water	water
Date Received	8/27/93	8/27/93	8/27/93
% Dry Weight			
Sequence Date	#5-09/01/93		#5-09/01/93
Leaded Gas			
JP-4	<200		<200
Lube Oil	<2000		<2000
Diesel	~~≤200~~ <2500		~~≤200~~ <2500
Spike Level			
Unknown Semi-vola			
Pentacosane	91		84
Sequence Date			
PCB 1221			
PCB 1232			
PCB 1016			
PCB 1242			
PCB 1248			
PCB 1254			
PCB 1260			
Spike Level			
Dibutyl Chlorendate			
Sequence Date			
alpha-BHC			
beta-BHC			
gamma-BHC			
delta-BHC			
Heptachlor			
Aldrin			
Heptachlor Epoxide			
Endosulfan I			
DDE			
Dieldrin			
Endrin			
Endosulfan II			
DDD			
Endrin Aldehyde			
DDT			
Endosulfan Sulfate			
Endrin Ketone			
Methoxy Chlor			
Chlordane			
Dibutyl Chlorendate			
Spike Level			
Vol Sequence		#3&4-09/02/93	
CCl4		<1	
TCA		<1	
Benzene		9	
TCE		<1	
Toluene		42 J	
PCE		<1	
Ethylbenzene		14 J	
Xylenes		380 J	
Gasoline		~~470~~ 1690 J	
Spike level			
BFB		129	

compiled by sgm 9-15-95

ICF ID	BRW-SS01-SW02	BRW-SS01-SW03	BRW-SS01-SW03
F&BI Number	1166	1168	1170
Sample Type	water	water	water
Date Received	8/27/93	8/27/93	8/27/93
% Dry Weight			
Sequence Date		#5-09/01/93	
Leaded Gas			
JP-4		<200	
Lube Oil		<2000	
Diesel		~~<200~~ <2500	
Spike Level			
Unknown Semi-vola			
Pentacosane		84	
Sequence Date			
PCB 1221			
PCB 1232			
PCB 1016			
PCB 1242			
PCB 1248			
PCB 1254			
PCB 1260			
Spike Level			
Dibutyl Chlorendate			
Sequence Date			
alpha-BHC			
beta-BHC			
gamma-BHC			
delta-BHC			
Heptachlor			
Aldrin			
Heptachlor Epoxide			
Endosulfan I			
DDE			
Dieldrin			
Endrin			
Endosulfan II			
DDD			
Endrin Aldehyde			
DDT			
Endosulfan Sulfate			
Endrin Ketone			
Methoxy Chlor			
Chlordane			
Dibutyl Chlorendate			
Spike Level			
Vol Sequence	#3&4-09/02/93		#3&4-09/02/93
CCl4	<1		<1
TCA	<1		<1
Benzene	<1		2
TCE	<1		~~8~~ <1
Toluene	<1		2 J
PCE	<1		~~18~~ <1
Ethylbenzene	<1		6 J
Xylenes	<2		29 J
Gasoline	~~<50~~ <100 J		~~<50~~ <100 J
Spike level			
BFB	139		~~110~~ 100

Compiled by [illegible] 9-15-[illegible]

ICF ID	BRW-SS01-SW04	BRW-SS01-SW04	BRW-SS01-SW05
F&BI Number	1172	1174	1176
Sample Type	water	water	water
Date Received	8/27/93	8/27/93	8/27/93
% Dry Weight			
Sequence Date	#5-09/01/93		#5-09/01/93
Leaded Gas			
JP-4	<200		<200
Lube Oil	<2000		<2000
Diesel	~~<200~~ <2500		~~<200~~ <2500
Spike Level			
Unknown Semi-vola			
Pentacosane	103		83
Sequence Date			
PCB 1221			
PCB 1232			
PCB 1016			
PCB 1242			
PCB 1248			
PCB 1254			
PCB 1260			
Spike Level			
Dibutyl Chlorendate			
Sequence Date			
alpha-BHC			
beta-BHC			
gamma-BHC			
delta-BHC			
Heptachlor			
Aldrin			
Heptachlor Epoxide			
Endosulfan I			
DDE			
Dieldrin			
Endrin			
Endosulfan II			
DDD			
Endrin Aldehyde			
DDT			
Endosulfan Sulfate			
Endrin Ketone			
Methoxy Chlor			
Chlordane			
Dibutyl Chlorendate			
Spike Level			
Vol Sequence		#3&4-09/02/93	
CCl4		<1	
TCA		<1	
Benzene		<1	
TCE		<1	
Toluene		~~8~~ <1	
PCE		<1	
Ethylbenzene		<1	
Xylenes		~~8~~ <2	
Gasoline		~~<50~~ <100	
Spike level			
BFB		91	

Compiled by SAM 9-15-93

ICF ID	BRW-SS01-SW05	BRW-SS01-SW06	BRW-SS01-SW06
F&BI Number	1178	1180	1182
Sample Type	water	water	water
Date Received	8/27/93	8/27/93	8/27/93
% Dry Weight			
Sequence Date		#5-09/01/93	
Leaded Gas			
JP-4		<200	
Lube Oil		<2000	
Diesel		~~≤200~~ <2500	
Spike Level			
Unknown Semi-vola			
Pentacosane		103	
Sequence Date			
PCB 1221			
PCB 1232			
PCB 1016			
PCB 1242			
PCB 1248			
PCB 1254			
PCB 1260			
Spike Level			
Dibutyl Chlorendate			
Sequence Date			
alpha-BHC			
beta-BHC			
gamma-BHC			
delta-BHC			
Heptachlor			
Aldrin			
Heptachlor Epoxide			
Endosulfan I			
DDE			
Dieldrin			
Endrin			
Endosulfan II			
DDD			
Endrin Aldehyde			
DDT			
Endosulfan Sulfate			
Endrin Ketone			
Methoxy Chlor			
Chlordane			
Dibutyl Chlorendate			
Spike Level			
Vol Sequence	#3&4-09/02/93		#3&4-09/02/93
CCl4	<1		<1
TCA	<1		<1
Benzene	<1		<1
TCE	<1		<1
Toluene	<1		<1
PCE	<1		<1
Ethylbenzene	<1		<1
Xylenes	<2		<2
Gasoline	~~≤50~~ <100J		~~≤50~~ <100J
Spike level			
BFB	127		130

Compiled by SAM 9-15-95

ICF ID	BRW-SS01-SW07	BRW-SS01-SW07	BRW-SS01-SW08
F&BI Number	1184	1208	1188
Sample Type	water	water	water
Date Received	8/27/93	8/27/93	8/27/93
% Dry Weight			
Sequence Date		#5-09/01/93	
Leaded Gas			
JP-4		<200	
Lube Oil		<2000	
Diesel		~~≤200~~ <2500	
Spike Level			
Unknown Semi-vola			
Pentacosane		104	
Sequence Date			
PCB 1221			
PCB 1232			
PCB 1016			
PCB 1242			
PCB 1248			
PCB 1254			
PCB 1260			
Spike Level			
Dibutyl Chlorendate			
Sequence Date			
alpha-BHC			
beta-BHC			
gamma-BHC			
delta-BHC			
Heptachlor			
Aldrin			
Heptachlor Epoxide			
Endosulfan I			
DDE			
Dieldrin			
Endrin			
Endosulfan II			
DDD			
Endrin Aldehyde			
DDT			
Endosulfan Sulfate			
Endrin Ketone			
Methoxy Chlor			
Chlordane			
Dibutyl Chlorendate			
Spike Level			
Vol Sequence	#3&4-09/02/93		#3&4-09/02/93
CCl4	<1		<1
TCA	<1		<1
Benzene	<1		<1
TCE	<1		<1
Toluene	<1		<1
PCE	<1		<1
Ethylbenzene	<1		<1
Xylenes	<2		<2
Gasoline	~~≤50~~ <100 J		~~≤50~~ <100 J
Spike level			
BFB	119		137

ANALYTICAL DATA SHEETS FOR THE GARAGE (SS02)

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES
SINCE 1908

REPORT of ANALYSIS

Chemlab Ref.# :93.4424-9
Client Sample ID :BRW-SS02-S02 BARROW
Matrix :SOIL

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70209
Report Completed :11/02/93
Collected :08/27/93 @ 14:30 hrs
Received :08/29/93 @ 12:45 hrs
Technical Director:STEPHEN C. EDE
Released By : C. Homestead

Sample Remarks: SAMPLE COLLECTED BY: D. NOE AND ROBERT C.C.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Volatile Organics				EPA 8260				
Benzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Bromobenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Bromochloromethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Bromodichloromethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Bromoform	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Bromomethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
n-Butylbenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
sec-Butylbenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
tert-Butylbenzne	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Carbon Tetrachloride	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Chlorobenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Chloroethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Chloroform	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Chloromethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
2-Chlorotoluene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
4-Chlorotoluene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Dibromochloromethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
12Dibromo3Chloropropane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,2-Dibromoethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Dibromomethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,2-Dichlorobenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,3-Dichlorobenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,4-Dichlorobenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Dichlorodifluoromethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,1-Dichloroethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,2-Dichloroethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,1-Dichloroethene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
cis-1,2-Dichloroethene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
trans1,2-Dichloroethene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,2-Dichloropropane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,3-Dichloropropane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
2,2-Dichloropropane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,1-Dichloropropene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Ethylbenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Hexachlorobutadiene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Isopropylbenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
p-Isopropyltoluene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM

COMMERCIAL TESTING & ENGINEERING CO.

ENVIRONMENTAL LABORATORY SERVICES

SINCE 1909

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4424-9
Client Sample ID :BRW-SS02-S02 BARROW
Matrix :SOIL

Methylene Chloride	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Napthalene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
n-Propylbenzene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Styrene	0.187		mg/Kg	EPA 8260	08/30	09/05	KWM
1112-Tetrachloroethane	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1122-Tetrachloroethane	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Tetrachloroethene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Toluene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,2,3-Trichlorobenzene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,2,4-Trichlorobenzene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,1,1-Trichloroethane	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,1,2-Trichloroethane	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Trichloroethene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Trichlorofluoromethane	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,2,3-Trichloropropane	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,2,4-Trimethylbenzene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,3,5-Trimethylbenzene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Vinyl Chloride	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
p+m-Xylene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
o-Xylene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Semivolatile Organics				EPA 8270			
Phenol	2.10	U	mg/Kg	EPA 8270	09/10	10/14	[illegible]
bis(2-Chloroethyl)ether	2.10	U	mg/Kg	EPA 8270	09/10	10/14	[illegible]
2-Chlorophenol	2.10	U	mg/Kg	EPA 8270	09/10	10/14	GV
1,3-Dichlorobenzene	2.10	U	mg/Kg	EPA 8270	09/10	10/14	GV
1,4-Dichlorobenzene	2.10	U	mg/Kg	EPA 8270	09/10	10/14	GV
Benzyl Alcohol	2.10	U	mg/Kg	EPA 8270	09/10	10/14	GV
1,2-Dichlorobenzene	2.10	U	mg/Kg	EPA 8270	09/10	10/14	GV
2-Methylphenol	2.10	U	mg/Kg	EPA 8270	09/10	10/14	GV
bis(2-Chloroisopropyl)e	2.10	U	mg/Kg	EPA 8270	09/10	10/14	GV
4-Methylphenol	2.10	U	mg/Kg	EPA 8270	09/10	10/14	GV
n-Nitroso-di-n-Propylam	2.10	U	mg/Kg	EPA 8270	09/10	10/14	GV
Hexachloroethane	2.10	U	mg/Kg	EPA 8270	09/10	10/14	GV
Nitrobenzene	2.10	U	mg/Kg	EPA 8270	09/10	10/14	GV
Isophorone	2.10	U	mg/Kg	EPA 8270	09/10	10/14	GV
2-Nitrophenol	2.10	U	mg/Kg	EPA 8270	09/10	10/14	GV
2,4-Dimethylphenol	2.10	U	mg/Kg	EPA 8270	09/10	10/14	GV
Benzoic Acid	2.10	U	mg/Kg	EPA 8270	09/10	10/14	GV
bis(2-Chloroethoxy)Meth	2.10	U	mg/Kg	EPA 8270	09/10	10/14	GV
2,4-Dichlorophenol	2.10	U	mg/Kg	EPA 8270	09/10	10/14	GV
1,2,4-Trichlorobenzene	2.10	U	mg/Kg	EPA 8270	09/10	10/14	GV
Naphthalene	2.10	U	mg/Kg	EPA 8270	09/10	10/14	GV
4-Chloroaniline	2.10	U	mg/Kg	EPA 8270	09/10	10/14	GV
Hexachlorobutadiene	2.10	U	mg/Kg	EPA 8270	09/10	10/14	GV
4-Chloro-3-Methylphenol	2.10	U	mg/Kg	EPA 8270	09/10	10/14	GV
2-Methylnaphthalene	2.10	U	mg/Kg	EPA 8270	09/10	10/14	GV
Hexachlorocyclopentadie	2.10	U	mg/Kg	EPA 8270	09/10	10/14	GV
2,4,6-Trichlorophenol	2.10	U	mg/Kg	EPA 8270	09/10	10/14	GV
2,4,5-Trichlorophenol	2.10	U	mg/Kg	EPA 8270	09/10	10/14	GV
2-Chloronaphthalene	2.10	U	mg/Kg	EPA 8270	09/10	10/14	[illegible]

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4424-9
Client Sample ID :BRW-SS02-S02 BARROW
Matrix :SOIL

2-Nitroaniline	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
Dimethylphthalate	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
Acenaphthylene	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
2,6-Dinitrotoluene	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
3-Nitroaniline	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
Acenaphthene	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
2,4-Dinitrophenol	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
4-Nitrophenol	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
Dibenzofuran	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
2,4-Dinitrotoluene	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
Diethylphthalate	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
4-Chlorophenyl-Phenylet	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
Fluorene	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
4-Nitroaniline	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
4,6-Dinitro-2-Methylphe	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
n-Nitrosodiphenylamine	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
4-Bromophenyl-Phenyleth	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
Hexachlorobenzene	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
Pentachlorophenol	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
Phenanthrene	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
Anthracene	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
di-n-Butylphthalate	2.50	U	mg/Kg	EPA 8270		09/10	10/14	GV
Fluoranthene	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
Pyrene	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
Butylbenzylphthalate	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
3,3-Dichlorobenzidine	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
Benzo(a)Anthracene	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
Chrysene	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
bis(2-Ethylhexyl)Phthal	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
di-n-Octylphthalate	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
Benzo(b)Fluoranthene	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
Benzo(k)Fluoranthene	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
Benzo(a)Pyrene	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
Indeno(1,2,3-cd)Pyrene	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
Dibenz(a,h)Anthracene	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
Benzo(g,h,i)Perylene	2.10	U	mg/Kg	EPA 8270		09/10	10/14	GV
Sample Preparation	---			EPA 3050 Digest				
Total Metals Analysis	---			-				
ICP Screen, ICF				EPA	n/a			
Aluminum	1000		mg/L	EPA 6010		08/31	09/02	DLG
Antimony	51	U	mg/L	EPA 6010		08/31	09/02	DLG
Arsenic	51	U	mg/L	EPA 6010		08/31	09/02	DLG
Barium	110		mg/L	EPA 6010		08/31	09/02	DLG
Beryllium	2.6	U	mg/L	EPA 6010		08/31	09/02	DLG
Cadmium	3.9		mg/L	EPA 6010		08/31	09/02	DLG
Calcium	1200		mg/L	EPA 6010		08/31	09/02	DLG
Chromium	31		mg/L	EPA 6010		08/31	09/02	DLG
Cobalt	5.1	U	mg/L	EPA 6010		08/31	09/02	DLG
Copper	20		mg/L	EPA 6010		08/31	09/02	DLG
Iron	7600		mg/L	EPA 6010		08/31	09/02	DLG

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES
SINCE 1908

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4424-9
Client Sample ID :BRW-SS02-S02 BARROW
Matrix :SOIL

Lead	150		mg/L	EPA 6010	08/31	09/02	DLG
Magnesium	650		mg/L	EPA 6010	08/31	09/02	DLG
Manganese	45		mg/L	EPA 6010	08/31	09/02	DLG
Molybdenum	2.6	U	mg/L	EPA 6010	08/31	09/02	DLG
Nickel	5.2		mg/L	EPA 6010	08/31	09/02	DLG
Potassium	350		mg/L	EPA 6010	08/31	09/06	DFL
Selenium	51	U	mg/L	EPA 6010	08/31	09/02	DLG
Silver	2.6	U	mg/L	EPA 6010	08/31	09/02	DLG
Sodium	100		mg/L	EPA 6010	08/31	09/06	DFL
Thallium	0.24	U	mg/L	EPA 7841	08/30	09/01	KAW
Vanadium	8.1		mg/L	EPA 6010	08/31	09/02	DLG
Zinc	270		mg/L	EPA 6010	08/31	09/02	DLG

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* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

SINCE 1908

REPORT of ANALYSIS

Chemlab Ref.# :93.4627-1
Client Sample ID :BRW-SS02-2S06 BARROW
Matrix :SOIL

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70637
Report Completed :10/05/93
Collected :09/06/93 @ 13:15 hr
Received :09/07/93 @ 11:00 hr
Technical Director:STEPHEN C. EDE
Released By : C. Homestead

Sample Remarks: SAMPLE COLLECTED BY: S.M. AND J.P.

Qualifier/Comments

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Ini
Percent Solids	95.8		%	SM17 2540G			09/08	EA
Hydrocarbons EPH	292		mg/Kg	3510/3550/8100M		09/14	09/16	JB
Hydrocarbons VPH	2.05		mg/Kg	EPA 5030/8015M		09/08	09/13	WL
Volatile Organics				EPA 8260				
Benzene	0.020	U	mg/Kg	EPA 8260	(J)-A.1	09/08	09/22	MC
Bromobenzene	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC
Bromochloromethane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC
Bromodichloromethane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC
Bromoform	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC
Bromomethane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC
n-Butylbenzene	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC
sec-Butylbenzene	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC
tert-Butylbenzne	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC
Carbon Tetrachloride	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC
Chlorobenzene	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC
Chloroethane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC
Chloroform	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC
Chloromethane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC
2-Chlorotoluene	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC
4-Chlorotoluene	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC
Dibromochloromethane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC
12Dibromo3Chloropropane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC
1,2-Dibromoethane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC
Dibromomethane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC
1,2-Dichlorobenzene	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC
1,3-Dichlorobenzene	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC
1,4-Dichlorobenzene	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC
Dichlorodifluoromethane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC
1,1-Dichloroethane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC
1,2-Dichloroethane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC
1,1-Dichloroethene	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC
cis-1,2-Dichloroethene	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC
trans1,2-Dichloroethene	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC
1,2-Dichloropropane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC
1,3-Dichloropropane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC
2,2-Dichloropropane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC
1,1-Dichloropropene	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MC

2-22-94

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES
SINCE 1908

5633 B S[illegible]ET
ANCHORAGE, A[illegible]8
TEL: (907) 5[illegible]43
FAX: (907) 561-5301

REPORT of ANALYSIS

Chemlab Ref.# :93.4627-1
Client Sample ID :BRW-SS02-2S06 BARROW
Matrix :SOIL

Qualifier / Comments

Ethylbenzene	0.020	U	mg/Kg	EPA 8260 (JJ)-A.1	09/08	09/22	MC
Hexachlorobutadiene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MC
Isopropylbenzene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MC
p-Isopropyltoluene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MC
Methylene Chloride	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MC
Napthalene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MC
n-Propylbenzene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MC
Styrene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MC
1112-Tetrachloroethane	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MC
1122-Tetrachloroethane	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MC
Tetrachloroethene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MC
Toluene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MC
1,2,3-Trichlorobenzene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MC
1,2,4-Trichlorobenzene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MC
1,1,1-Trichloroethane	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MC
1,1,2-Trichloroethane	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MC
Trichloroethene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MC
Trichlorofluoromethane	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MC
1,2,3-Trichloropropane	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MC
1,2,4-Trimethylbenzene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MC
1,3,5-Trimethylbenzene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MC
Vinyl Chloride	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MC
p+m-Xylene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MC
o-Xylene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MC

CD
2-22-94

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* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Th[illegible]

Compiled by SAM 9-15-95

ICF ID	BRW-SS02-S01	BRW-SS02-S02	BRW-SS02-S02
F&BI Number	1148	1150	1150 dup
Sample Type	soil	soil	soil
Date Received	8/27/93	8/27/93	8/27/93
% Dry Weight	96	97	
Sequence Date	#5-08/31/93	#5-08/31/93	#5-08/31/93
Leaded Gas			
JP-4	<50	<50	_50
Lube Oil	<100	240	800
Diesel	3300 J	~~250~~ high lube oil <250 J	1200 high lube oil
Spike Level			
Unknown Semi-vola			
Pentacosane	73	95	96
Sequence Date	#5-08/31/93	#5-08/31/93	#5-08/31/93
PCB 1221	<0.1	<0.1	
PCB 1232	<0.1	<0.1	<0.1
PCB 1016	<0.1	<0.1	<0.1
PCB 1242	<0.1	<0.1	<0.1
PCB 1248	<0.1	<0.1	23
PCB 1254	<0.1	14 J	<0.1
PCB 1260	<0.1	<0.1	<0.1
Spike Level			
Dibutyl Chlorendate	73	129	160
Sequence Date	#5-08/31/93		
alpha-BHC	<0.01		
beta-BHC	<0.01		
gamma-BHC	<0.01		
delta-BHC	<0.01		
Heptachlor	<0.01		
Aldrin	<0.01		
Heptachlor Epoxide	<0.01		
Endosulfan I	<0.01		
DDE	<0.01		
Dieldrin	<0.01		
Endrin	<0.01		
Endosulfan II	<0.01		
DDD	<0.01		
Endrin Aldehyde	<0.01		
DDT	<0.01		
Endosulfan Sulfate	<0.01		
Endrin Ketone	<0.01		
Methoxy Chlor	<0.1 R		
Chlordane	<0.5 R		
Dibutyl Chlorendate	95		
Spike Level			
Vol Sequence	#1&2-09/02/93	#1&2-09/02/93	#1&2-09/02/93
CCl4	<0.02	<0.02	<0.02
TCA	<0.02	<0.02	<0.02
Benzene	<0.02	<0.02	<0.02
TCE	<0.02	<0.02	<0.02
Toluene	1.3	<0.02	<0.02
PCE	<0.02	<0.02	<0.02
Ethylbenzene	0.4	<0.02	<0.02
Xylenes	~~1.2~~ 6.9 J	<0.04	<0.04
Gasoline	~~89~~ diesel 113 J	<1 J	<1 J
Spike level			
BFB	88	94	98

Compiled by SAM 9-15-93

ICF ID	BRW-SS02-S02	BRW-SS02-S02	BRW-SS02-S03
F&BI Number	1150 ms	1150 msd	1152
Sample Type	soil	soil	soil
Date Received	8/27/93	8/27/93	8/27/93
% Dry Weight			96
Sequence Date	#5-08/31/93	#5-08/31/93	#5-08/31/93
Leaded Gas			
JP-4			<50
Lube Oil			290
Diesel			830 cutting oil R
Spike Level	500	500	
Unknown Semi-vola			
Pentacosane	110	113	85
Sequence Date			#5-08/31/93
PCB 1221			<0.1
PCB 1232			<0.1
PCB 1016			<0.1
PCB 1242			<0.1
PCB 1248			<0.1
PCB 1254			3.7 J
PCB 1260			<0.1
Spike Level			
Dibutyl Chlorendate			85
Sequence Date			
alpha-BHC			
beta-BHC			
gamma-BHC			
delta-BHC			
Heptachlor			
Aldrin			
Heptachlor Epoxide			
Endosulfan I			
DDE			
Dieldrin			
Endrin			
Endosulfan II			
DDD			
Endrin Aldehyde			
DDT			
Endosulfan Sulfate			
Endrin Ketone			
Methoxy Chlor			
Chlordane			
Dibutyl Chlorendate			
Spike Level			
Vol Sequence	#1&2-09/02/93	#1&2-09/02/93	#1&2-09/02/93
CCl4	84	88	<0.02
TCA	102	117	<0.02
Benzene	99	125	<0.02
TCE	120	136	0.6
Toluene	102	109	0.04
PCE	99	112	0.3
Ethylbenzene	95	111	0.9
Xylenes	98	112	2.4 J
Gasoline			~~21~~ diesel 63J
Spike level	1	1	
BFB	91	94	111

Compiled by SGM 9-15-9?

ICF ID	BRW-SS02-S04	BRW-SS02-S05	BRW-SS02-S05
F&BI Number	1204	1206	1206 dup
Sample Type	soil	soil	soil
Date Received	8/27/93	8/27/93	8/27/93
% Dry Weight	97	97	97
Sequence Date	#5-08/31/93	#5-08/31/93	
Leaded Gas			
JP-4	<50	<50	
Lube Oil	710	690	
Diesel	570 high lube oil J	450 high lube oil J	
Spike Level			
Unknown Semi-vola			
Pentacosane	107	130	
Sequence Date	#5-08/31/93	#5-08/31/93	
PCB 1221	<0.1	<0.1	
PCB 1232	<0.1	<0.1	
PCB 1016	<0.1	<0.1	
PCB 1242	<0.1	<0.1	
PCB 1248	<0.1	<0.1	
PCB 1254	~~12~~ 11.0 J	~~9.5~~ 10.4 J	
PCB 1260	<0.1	<0.1	
Spike Level			
Dibutyl Chlorendate	200	140	
Sequence Date			
alpha-BHC			
beta-BHC			
gamma-BHC			
delta-BHC			
Heptachlor			
Aldrin			
Heptachlor Epoxide			
Endosulfan I			
DDE			
Dieldrin			
Endrin			
Endosulfan II			
DDD			
Endrin Aldehyde			
DDT			
Endosulfan Sulfate			
Endrin Ketone			
Methoxy Chlor			
Chlordane			
Dibutyl Chlorendate			
Spike Level			
Vol Sequence	#1&2-09/02/93	#1&2-09/02/93	
CCl4	<0.02	<0.02	
TCA	<0.02	<0.02	
Benzene	<0.02	<0.02	
TCE	<0.02	<0.02	
Toluene	<0.02	<0.02	
PCE	<0.02	<0.02	
Ethylbenzene	<0.02	<0.02	
Xylenes	<0.04	<0.04	
Gasoline	<1 J	<1 J	
Spike level			
BFB	95	95	

Compiled by sgm 9-15-95

ICF ID	BRW-SS02-SD01
F&BI Number	1146
Sample Type	soil
Date Received	8/27/93
% Dry Weight	25
Sequence Date	#5-08/31/93
Leaded Gas	
JP-4	<200
Lube Oil	<400
Diesel	<200
Spike Level	
Unknown Semi-vola	
Pentacosane	58
Sequence Date	#5-08/31/93
PCB 1221	<0.1
PCB 1232	<0.1
PCB 1016	<0.1
PCB 1242	<0.1
PCB 1248	<0.1
PCB 1254	<0.1
PCB 1260	<0.1
Spike Level	
Dibutyl Chlorendate	58
Sequence Date	#5-08/31/93
alpha-BHC	<0.01
beta-BHC	<0.01
gamma-BHC	<0.01
delta-BHC	<0.01
Heptachlor	<0.01
Aldrin	<0.01
Heptachlor Epoxide	<0.01
Endosulfan I	<0.01
DDE	<0.01
Dieldrin	<0.01
Endrin	<0.01
Endosulfan II	<0.01
DDD	<0.01
Endrin Aldehyde	<0.01
DDT	<0.01
Endosulfan Sulfate	<0.01
Endrin Ketone	<0.01
Methoxy Chlor	<0.1 R
Chlordane	<0.5 R
Dibutyl Chlorendate	97
Spike Level	
Vol Sequence	#1&2-09/02/93
CCl4	<0.08
TCA	<0.08
Benzene	<0.08
TCE	<0.08
Toluene	<0.08
PCE	<0.08
Ethylbenzene	<0.08
Xylenes	<0.2
Gasoline	<1
Spike level	
BFB	97

ANALYTICAL DATA SHEETS FOR THE AIR TERMINAL AREA (SS03)

COMMERCIAL TESTING & ENGINEERING CO.

ENVIRONMENTAL LABORATORY SERVICES

SINCE 1908

REPORT of ANALYSIS

Chemlab Ref.# :93.4424-1
Client Sample ID :BRW-~~AOC2~~-S04 BARROW
Matrix :SOIL SS03

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70209
Report Completed :11/02/93
Collected :08/27/93 @ 11:35 hrs
Received :08/29/93 @ 12:45 hrs
Technical Director:STEPHEN C. EDE
Released By :

Sample Remarks: SAMPLE COLLECTED BY: D. NOE AND ROBERT C.C. B = THIS FLAG IS USED WHEN THE ANALYTE IS FOUND IN THE ASSICIATED BLANK AS WELL AS IN THE SAMPLE.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Volatile Organics				EPA 8260				
Benzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Bromobenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Bromochloromethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Bromodichloromethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Bromoform	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Bromomethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
n-Butylbenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
sec-Butylbenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
tert-Butylbenzne	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Carbon Tetrachloride	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Chlorobenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Chloroethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Chloroform	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Chloromethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
2-Chlorotoluene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
4-Chlorotoluene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Dibromochloromethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
12Dibromo3Chloropropane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,2-Dibromoethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Dibromomethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,2-Dichlorobenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,3-Dichlorobenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,4-Dichlorobenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Dichlorodifluoromethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,1-Dichloroethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,2-Dichloroethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,1-Dichloroethene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
cis-1,2-Dichloroethene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
trans1,2-Dichloroethene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,2-Dichloropropane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,3-Dichloropropane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
2,2-Dichloropropane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,1-Dichloropropene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Ethylbenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Hexachlorobutadiene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

SINCE 1908

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

SML
K3094

REPORT of ANALYSIS

Qualifiers/Comments

Chemlab Ref.# :93.4424-1
Client Sample ID :BRW-~~A0CZ~~-S04 BARROW
Matrix :SOIL SS03

Isopropylbenzene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
p-Isopropyltoluene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Methylene Chloride	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Napthalene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
n-Propylbenzene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Styrene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1112-Tetrachloroethane	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1122-Tetrachloroethane	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Tetrachloroethene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Toluene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,2,3-Trichlorobenzene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,2,4-Trichlorobenzene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,1,1-Trichloroethane	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,1,2-Trichloroethane	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Trichloroethene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Trichlorofluoromethane	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,2,3-Trichloropropane	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,2,4-Trimethylbenzene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,3,5-Trimethylbenzene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Vinyl Chloride	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
p+m-Xylene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
o-Xylene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Semivolatile Organics				EPA 8270			
Phenol	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
bis(2-Chloroethyl)ether	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
2-Chlorophenol	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
1,3-Dichlorobenzene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
1,4-Dichlorobenzene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Benzyl Alcohol	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
1,2-Dichlorobenzene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
2-Methylphenol	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
bis(2-Chloroisopropyl)e	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
4-Methylphenol	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
n-Nitroso-di-n-Propylam	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Hexachloroethane	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Nitrobenzene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Isophorone	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
2-Nitrophenol	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
2,4-Dimethylphenol	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Benzoic Acid	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
bis(2-Chloroethoxy)Meth	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
2,4-Dichlorophenol	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
1,2,4-Trichlorobenzene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Naphthalene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
4-Chloroaniline	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Hexachlorobutadiene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
4-Chloro-3-Methylphenol	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
2-Methylnaphthalene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Hexachlorocyclopentadie	0.200	U	mg/Kg	EPA 8270 (J) - D.J	09/10	10/11	GV
2,4,6-Trichlorophenol	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV

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2-18-94

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES
SINCE 1908

SMK 11-30-94

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Qualifier Comments

Chemlab Ref.# :93.4424-1
Client Sample ID :BRW-~~A0C2~~-S04 BARROW
Matrix :SOIL SS03

2,4,5-Trichlorophenol	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
2-Chloronaphthalene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
2-Nitroaniline	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Dimethylphthalate	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Acenaphthylene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
2,6-Dinitrotoluene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
3-Nitroaniline	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Acenaphthene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
2,4-Dinitrophenol	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
4-Nitrophenol	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Dibenzofuran	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
2,4-Dinitrotoluene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Diethylphthalate	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
4-Chlorophenyl-Phenylet	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Fluorene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
4-Nitroaniline	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
4,6-Dinitro-2-Methylphe	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
n-Nitrosodiphenylamine	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
4-Bromophenyl-Phenyleth	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Hexachlorobenzene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Pentachlorophenol	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Phenanthrene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Anthracene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
di-n-Butylphthalate	2.16	B	mg/Kg	EPA 8270 (u) - E.1	09/10	10/11	GV
Fluoranthene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Pyrene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Butylbenzylphthalate	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
3,3-Dichlorobenzidine	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Benzo(a)Anthracene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Chrysene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
bis(2-Ethylhexyl)Phthal	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
di-n-Octylphthalate	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Benzo(b)Fluoranthene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Benzo(k)Fluoranthene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Benzo(a)Pyrene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Indeno(1,2,3-cd)Pyrene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Dibenz(a,h)Anthracene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Benzo(g,h,i)Perylene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Sample Preparation	---			EPA 3050 Digest			
Total Metals Analysis	---			-			
ICP Screen, ICF				EPA	n/a		
Aluminum	800	U	mg/Kg	EPA 6010	08/31	09/02	DLG
Antimony	5.5	U	mg/Kg	EPA 6010	08/31	09/02	DLG
Arsenic	55	U	mg/Kg	EPA 6010	08/31	09/02	DLG
Barium	70		mg/Kg	EPA 6010	08/31	09/02	DLG
Beryllium	2.7	U	mg/Kg	EPA 6010	08/31	09/02	DLG
Cadmium	2.7	U	mg/Kg	EPA 6010	08/31	09/02	DLG
Calcium	680	J	mg/Kg J.1	EPA 6010	08/31	09/02	DLG
Chromium	2.7	U	mg/Kg	EPA 6010	08/31	09/02	DLG
Cobalt	5.5	U	mg/Kg	EPA 6010	08/31	09/02	DLG

2-14-94
OR

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES
SINCE 1908

SMF 11-30-94

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4424-1
Client Sample ID :BRW-~~A0C2~~-S04 BARROW
Matrix :SOIL SS03

		Qualifier		Comment				
Copper	2.8		mg/Kg		EPA 6010	08/31	09/02	DLG
Iron	5600		mg/Kg		EPA 6010	08/31	09/02	DLG
Lead	5.5	U	mg/Kg		EPA 6010	08/31	09/02	DLG
Magnesium	400	J	mg/Kg	J.1	EPA 6010	08/31	09/02	DLG
Manganese	25		mg/Kg		EPA 6010	08/31	09/02	DLG
Molybdenum	2.7	U	mg/Kg		EPA 6010	08/31	09/02	DLG
Nickel	3.0		mg/Kg		EPA 6010	08/31	09/02	DLG
Potassium	330		mg/Kg		EPA 6010	08/31	09/06	DFL
Selenium	5.5	U	mg/Kg		EPA 6010	08/31	09/02	DLG
Silver	2.7	U J	mg/Kg	J.1	EPA 6010	08/31	09/02	DLG
Sodium	86		mg/Kg		EPA 6010	08/31	09/06	DFL
Thallium	0.27	U	mg/Kg		EPA 7841	08/30	09/01	KAW
Vanadium	8.5		mg/Kg		EPA 6010	08/31	09/02	DLG
Zinc	9.2		mg/Kg		EPA 6010	08/31	09/02	DLG
TOC, Soil	1380		mg/Kg		PSEP Ref Lab			

All chgs S.L 2/15/94.

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* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES
SINCE 1908

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

REPORT of ANALYSIS

Chemlab Ref.# :93.4424-2
Client Sample ID :BRW-~~AOC2~~-S04 BARROW DUPLICATE
Matrix :SOIL SS03
8mf
12.6.95

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70209
Report Completed :11/02/93
Collected :08/27/93 @ 11:35 hrs
Received :08/29/93 @ 12:45 hrs
Technical Director:STEPHEN C. EDE
Released By : C. Vinestead

Sample Remarks: SAMPLE COLLECTED BY: D. NOE AND ROBERT C.C.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Sample Preparation	---			EPA 3050 Digest				
Total Metals Analysis	---			-				
ICP Screen, ICP				EPA	n/a			
Aluminum	730		mg/L	EPA 6010		08/31	09/02	DLG
Antimony	5.4	U	mg/L	EPA 6010		08/31	09/02	DLG
Arsenic	54	U	mg/L	EPA 6010		08/31	09/02	DLG
Barium	56		mg/L	EPA 6010		08/31	09/02	DLG
Beryllium	2.7	U	mg/L	EPA 6010		08/31	09/02	DLG
Cadmium	2.7	U	mg/L	EPA 6010		08/31	09/02	DLG
Calcium	900		mg/L	EPA 6010		08/31	09/02	DLG
Chromium	4.1		mg/L	EPA 6010		08/31	09/02	DLG
Cobalt	5.4	U	mg/L	EPA 6010		08/31	09/02	DLG
Copper	2.8		mg/L	EPA 6010		08/31	09/02	DLG
Iron	6400		mg/L	EPA 6010		08/31	09/02	DLG
Lead	13		mg/L	EPA 6010		08/31	09/02	DLG
Magnesium	430		mg/L	EPA 6010		08/31	09/02	DLG
Manganese	28		mg/L	EPA 6010		08/31	09/02	DLG
Molybdenum	2.8	U	mg/L	EPA 6010		08/31	09/02	DLG
Nickel	3.5		mg/L	EPA 6010		08/31	09/02	DLG
Potassium	380		mg/L	EPA 6010		08/31	09/06	DFL
Selenium	54	U	mg/L	EPA 6010		08/31	09/02	DLG
Silver	2.7		mg/L	EPA 6010		08/31	09/02	DLG
Sodium	72		mg/L	EPA 6010		08/31	09/06	DFL
Thallium	0.27	U	mg/L	EPA 7841		08/30	09/01	KAW
Vanadium	9.2		mg/L	EPA 6010		08/31	09/02	DLG
Zinc	11		mg/L	EPA 6010		08/31	09/02	DLG

* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

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NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.

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REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4424-3
Client Sample ID :BRW-~~AOC2~~-S04 BARROW SPIKE
Matrix :SOIL SS03
sule 12.6.95

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70209
Report Completed :11/02/93
Collected :08/27/93 @ 11:35 hrs
Received :08/29/93 @ 12:45 hrs
Technical Director:STEPHEN C. EDE
Released By : C. Homestead

Sample Remarks: SAMPLE COLLECTED BY: D. NOE AND ROBERT C.C. B = THIS FLAG IS USED WHEN THE ANALYTE IS FOUND IN THE ASSOCIATED BLANK AS WELL AS IN THE SAMPLE. FOR MATRIX SPIKE AND SPIKE DUPLICATE RECOVERY AND RPD, SEE QC SUMMARY.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Volatile Organics				EPA 8260				
Benzene	0.194		mg/Kg	EPA 8260		08/30	09/05	KWM
Bromobenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Bromochloromethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Bromodichloromethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Bromoform	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Bromomethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	[illegible]
n-Butylbenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	[illegible]
sec-Butylbenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
tert-Butylbenzne	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Carbon Tetrachloride	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Chlorobenzene	0.191		mg/Kg	EPA 8260		08/30	09/05	KWM
Chloroethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Chloroform	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Chloromethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
2-Chlorotoluene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
4-Chlorotoluene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Dibromochloromethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
12Dibromo3Chloropropane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,2-Dibromoethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Dibromomethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,2-Dichlorobenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,3-Dichlorobenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,4-Dichlorobenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Dichlorodifluoromethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,1-Dichloroethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,2-Dichloroethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,1-Dichloroethene	0.035		mg/Kg	EPA 8260		08/30	09/05	KWM
cis-1,2-Dichloroethene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
trans1,2-Dichloroethene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,2-Dichloropropane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,3-Dichloropropane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
2,2-Dichloropropane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,1-Dichloropropene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Ethylbenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	[illegible]

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REPORT of ANALYSIS

Chemlab Ref.# :93.4424-3
Client Sample ID :BRW-~~AOC2~~-S04 BARROW SPIKE
SS03
Matrix :SOIL
Smt 12.6.95

5633 B STREET
ANCHORAGE, AK 99518
TEL. (907) 562-2343
FAX: (907) 561-5301

Hexachlorobutadiene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Isopropylbenzene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
p-Isopropyltoluene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Methylene Chloride	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Napthalene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
n-Propylbenzene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Styrene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1112-Tetrachloroethane	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1122-Tetrachloroethane	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Tetrachloroethene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Toluene	0.190		mg/Kg	EPA 8260	08/30	09/05	KWM
1,2,3-Trichlorobenzene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,2,4-Trichlorobenzene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,1,1-Trichloroethane	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,1,2-Trichloroethane	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Trichloroethene	0.164		mg/Kg	EPA 8260	08/30	09/05	KWM
Trichlorofluoromethane	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,2,3-Trichloropropane	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,2,4-Trimethylbenzene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,3,5-Trimethylbenzene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Vinyl Chloride	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
p+m-Xylene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
o-Xylene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Semivolatile Organics				EPA 8270			
Phenol	1.89		mg/Kg	EPA 8270	09/10	10/11	GV
bis(2-Chloroethyl)ether	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
2-Chlorophenol	1.69		mg/Kg	EPA 8270	09/10	10/11	GV
1,3-Dichlorobenzene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
1,4-Dichlorobenzene	1.66		mg/Kg	EPA 8270	09/10	10/11	GV
Benzyl Alcohol	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
1,2-Dichlorobenzene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
2-Methylphenol	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
bis(2-Chloroisopropyl)e	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
4-Methylphenol	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
n-Nitroso-di-n-Propylam	2.22		mg/Kg	EPA 8270	09/10	10/11	GV
Hexachloroethane	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Nitrobenzene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Isophorone	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
2-Nitrophenol	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
2,4-Dimethylphenol	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Benzoic Acid	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
bis(2-Chloroethoxy)Meth	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
2,4-Dichlorophenol	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
1,2,4-Trichlorobenzene	1.80		mg/Kg	EPA 8270	09/10	10/11	GV
Naphthalene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
4-Chloroaniline	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Hexachlorobutadiene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
4-Chloro-3-Methylphenol	2.08		mg/Kg	EPA 8270	09/10	10/11	GV
2-Methylnaphthalene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Hexachlorocyclopentadie	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV

COMMERCIAL TESTING & ENGINEERING CO.
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5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

REPORT of ANALYSIS

Chemlab Ref.# :93.4424-3
Client Sample ID :BRW-~~A0C2~~-S04 BARROW SPIKE
Matrix :SOIL

SS03 ONLY 12-6-95

2,4,6-Trichlorophenol	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
2,4,5-Trichlorophenol	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
2-Chloronaphthalene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
2-Nitroaniline	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Dimethylphthalate	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Acenaphthylene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
2,6-Dinitrotoluene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
3-Nitroaniline	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Acenaphthene	1.96		mg/Kg	EPA 8270	09/10	10/11	GV
2,4-Dinitrophenol	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
4-Nitrophenol	2.40		mg/Kg	EPA 8270	09/10	10/11	GV
Dibenzofuran	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
2,4-Dinitrotoluene	2.05		mg/Kg	EPA 8270	09/10	10/11	GV
Diethylphthalate	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
4-Chlorophenyl-Phenylet	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Fluorene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
4-Nitroaniline	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
4,6-Dinitro-2-Methylphe	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
n-Nitrosodiphenylamine	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
4-Bromophenyl-Phenyleth	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Hexachlorobenzene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Pentachlorophenol	2.41		mg/Kg	EPA 8270	09/10	10/11	GV
Phenanthrene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	[illegible]
Anthracene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	[illegible]
di-n-Butylphthalate	4.94	B	mg/Kg	EPA 8270	09/10	10/11	GV
Fluoranthene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Pyrene	2.18		mg/Kg	EPA 8270	09/10	10/11	GV
Butylbenzylphthalate	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
3,3-Dichlorobenzidine	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Benzo(a)Anthracene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Chrysene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
bis(2-Ethylhexyl)Phthal	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
di-n-Octylphthalate	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Benzo(b)Fluoranthene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Benzo(k)Fluoranthene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Benzo(a)Pyrene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Indeno(1,2,3-cd)Pyrene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Dibenz(a,h)Anthracene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Benzo(g,h,i)Perylene	0.200	U	mg/Kg	EPA 8270	09/10	10/11	GV
Sample Preparation	---			EPA 3050 Digest			
Total Metals Analysis	---						
ICP Screen, ICP				EPA	n/a		
Aluminum	1200		mg/Kg	EPA 6010	08/31	09/02	DLG
Antimony	88		mg/Kg	EPA 6010	08/31	09/02	DLG
Arsenic	133		mg/Kg	EPA 6010	08/31	09/02	DLG
Barium	190		mg/Kg	EPA 6010	08/31	09/02	DLG
Beryllium	41		mg/Kg	EPA 6010	08/31	09/02	DLG
Cadmium	54		mg/Kg	EPA 6010	08/31	09/02	DLG
Calcium	6200		mg/Kg	EPA 6010	08/31	09/02	DLG
Chromium	110		mg/Kg	EPA 6010	08/31	09/02	[illegible]

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

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REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4424-3
Client Sample ID :BRW-~~AOC2~~-S04 BARROW SPIKE
Matrix :SOIL SS03 SMF 12.6.95

Cobalt	100	mg/Kg	EPA 6010	08/31	09/02	DLG
Copper	100	mg/Kg	EPA 6010	08/31	09/02	DLG
Iron	6000	mg/Kg	EPA 6010	08/31	09/02	DLG
Lead	100	mg/Kg	EPA 6010	08/31	09/02	DLG
Magnesium	5600	mg/Kg	EPA 6010	08/31	09/02	DLG
Manganese	140	mg/Kg	EPA 6010	08/31	09/02	DLG
Molybdenum	100	mg/Kg	EPA 6010	08/31	09/02	DLG
Nickel	110	mg/Kg	EPA 6010	08/31	09/02	DLG
Potassium	1400	mg/Kg	EPA 6010	08/31	09/02	DLG
Selenium	100	mg/Kg	EPA 6010	08/31	09/06	DFL
Silver	98	mg/Kg	EPA 6010	08/31	09/02	DLG
Sodium	1100	mg/Kg	EPA 6010	08/31	09/06	DFL
Thallium	2.3	mg/Kg	EPA 7841	08/30	09/01	KAW
Vanadium	110	mg/Kg	EPA 6010	08/31	09/02	DLG
Zinc	110	mg/Kg	EPA 6010	08/31	09/02	DLG

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* See Special Instructions Above
** See Sample Remarks Above
= Undetected. Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

REPORT of ANALYSIS

Chemlab Ref.# :93.4424-10
Client Sample ID :BRW-~~AOC2~~-S04 BARROW SPIKE DUPLICATE
Matrix :SOIL SS03 8Mp 12695

Client Name	:ICF KAISER ENGINEERING	WORK Order	:70209
Ordered By	:RAY MORRIS	Report Completed	:11/02/93
Project Name	:DEW LINE RI/FS BARROW	Collected	:08/27/93 @ 11:35 hrs
Project#	:41096-412-01	Received	:08/29/93 @ 12:45 hrs
PWSID	:UA	Technical Director	:STEPHEN C. EDE
		Released By	:

Sample Remarks: SAMPLE COLLECTED BY: D. NOE AND ROBERT C.C. 8270 SPIKING COMPOUNDS AND SURROGATE WERE LOST IN EXTRACTION PROCESS.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Volatile Organics				EPA 8260				
Benzene	0.186		mg/Kg	EPA 8260		08/30	09/05	KWM
Bromobenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Bromochloromethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Bromodichloromethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Bromoform	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Bromomethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
n-Butylbenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
sec-Butylbenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	[illegible]
tert-Butylbenzne	0.020	U	mg/Kg	EPA 8260		08/30	09/05	[illegible]
Carbon Tetrachloride	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Chlorobenzene	0.189		mg/Kg	EPA 8260		08/30	09/05	KWM
Chloroethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Chloroform	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Chloromethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
2-Chlorotoluene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
4-Chlorotoluene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Dibromochloromethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
12Dibromo3Chloropropane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,2-Dibromoethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Dibromomethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,2-Dichlorobenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,3-Dichlorobenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,4-Dichlorobenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Dichlorodifluoromethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,1-Dichloroethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,2-Dichloroethane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,1-Dichloroethene	0.031		mg/Kg	EPA 8260		08/30	09/05	KWM
cis-1,2-Dichloroethene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
trans1,2-Dichloroethene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,2-Dichloropropane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,3-Dichloropropane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
2,2-Dichloropropane	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
1,1-Dichloropropene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Ethylbenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Hexachlorobutadiene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	KWM
Isopropylbenzene	0.020	U	mg/Kg	EPA 8260		08/30	09/05	[illegible]

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES
SINCE 1908

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4424-10
Client Sample ID :BRW-~~AOC2~~-S04 BARROW SPIKE DUPLICATE SS03 SMD 12.695
Matrix :SOIL

p-Isopropyltoluene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Methylene Chloride	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Napthalene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
n-Propylbenzene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Styrene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1112-Tetrachloroethane	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1122-Tetrachloroethane	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Tetrachloroethene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Toluene	0.183		mg/Kg	EPA 8260	08/30	09/05	KWM
1,2,3-Trichlorobenzene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,2,4-Trichlorobenzene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,1,1-Trichloroethane	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,1,2-Trichloroethane	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Trichloroethene	0.167		mg/Kg	EPA 8260	08/30	09/05	KWM
Trichlorofluoromethane	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,2,3-Trichloropropane	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,2,4-Trimethylbenzene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
1,3,5-Trimethylbenzene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Vinyl Chloride	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
p+m-Xylene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
o-Xylene	0.020	U	mg/Kg	EPA 8260	08/30	09/05	KWM
Semivolatile Organics				EPA 8270			
Phenol	**		mg/Kg	EPA 8270			
bis(2-Chloroethyl)ether	**		mg/Kg	EPA 8270			
2-Chlorophenol	**		mg/Kg	EPA 8270			
1,3-Dichlorobenzene	**		mg/Kg	EPA 8270			
1,4-Dichlorobenzene	**		mg/Kg	EPA 8270			
Benzyl Alcohol	**		mg/Kg	EPA 8270			
1,2-Dichlorobenzene	**		mg/Kg	EPA 8270			
2-Methylphenol	**		mg/Kg	EPA 8270			
bis(2-Chloroisopropyl)e	**		mg/Kg	EPA 8270			
4-Methylphenol	**		mg/Kg	EPA 8270			
n-Nitroso-di-n-Propylam	**		mg/Kg	EPA 8270			
Hexachloroethane	**		mg/Kg	EPA 8270			
Nitrobenzene	**		mg/Kg	EPA 8270			
Isophorone	**		mg/Kg	EPA 8270			
2-Nitrophenol	**		mg/Kg	EPA 8270			
2,4-Dimethylphenol	**		mg/Kg	EPA 8270			
Benzoic Acid	**		mg/Kg	EPA 8270			
bis(2-Chloroethoxy)Meth	**		mg/Kg	EPA 8270			
2,4-Dichlorophenol	**		mg/Kg	EPA 8270			
1,2,4-Trichlorobenzene	**		mg/Kg	EPA 8270			
Naphthalene	**		mg/Kg	EPA 8270			
4-Chloroaniline	**		mg/Kg	EPA 8270			
Hexachlorobutadiene	**		mg/Kg	EPA 8270			
4-Chloro-3-Methylphenol	**		mg/Kg	EPA 8270			
2-Methylnaphthalene	**		mg/Kg	EPA 8270			
Hexachlorocyclopentadie	**		mg/Kg	EPA 8270			
2,4,6-Trichlorophenol	**		mg/Kg	EPA 8270			
2,4,5-Trichlorophenol	**		mg/Kg	EPA 8270			

COMMERCIAL TESTING & ENGINEERING CO.

ENVIRONMENTAL LABORATORY SERVICES

SINCE 1908

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4424-10
Client Sample ID :BRW-~~AOC2~~SS03-S04 BARROW SPIKE DUPLICATE
Matrix :SOIL

SMF 12-6-95

2-Chloronaphthalene	**	mg/Kg	EPA 8270
2-Nitroaniline	**	mg/Kg	EPA 8270
Dimethylphthalate	**	mg/Kg	EPA 8270
Acenaphthylene	**	mg/Kg	EPA 8270
2,6-Dinitrotoluene	**	mg/Kg	EPA 8270
3-Nitroaniline	**	mg/Kg	EPA 8270
Acenaphthene	**	mg/Kg	EPA 8270
2,4-Dinitrophenol	**	mg/Kg	EPA 8270
4-Nitrophenol	**	mg/Kg	EPA 8270
Dibenzofuran	**	mg/Kg	EPA 8270
2,4-Dinitrotoluene	**	mg/Kg	EPA 8270
Diethylphthalate	**	mg/Kg	EPA 8270
4-Chlorophenyl-Phenylet	**	mg/Kg	EPA 8270
Fluorene	**	mg/Kg	EPA 8270
4-Nitroaniline	**	mg/Kg	EPA 8270
4,6-Dinitro-2-Methylphe	**	mg/Kg	EPA 8270
n-Nitrosodiphenylamine	**	mg/Kg	EPA 8270
4-Bromophenyl-Phenyleth	**	mg/Kg	EPA 8270
Hexachlorobenzene	**	mg/Kg	EPA 8270
Pentachlorophenol	**	mg/Kg	EPA 8270
Phenanthrene	**	mg/Kg	EPA 8270
Anthracene	**	mg/Kg	EPA 8270
di-n-Butylphthalate	**	mg/Kg	EPA 8270
Fluoranthene	**	mg/Kg	EPA 8270
Pyrene	**	mg/Kg	EPA 8270
Butylbenzylphthalate	**	mg/Kg	EPA 8270
3,3-Dichlorobenzidine	**	mg/Kg	EPA 8270
Benzo(a)Anthracene	**	mg/Kg	EPA 8270
Chrysene	**	mg/Kg	EPA 8270
bis(2-Ethylhexyl)Phthal	**	mg/Kg	EPA 8270
di-n-Octylphthalate	**	mg/Kg	EPA 8270
Benzo(b)Fluoranthene	**	mg/Kg	EPA 8270
Benzo(k)Fluoranthene	**	mg/Kg	EPA 8270
Benzo(a)Pyrene	**	mg/Kg	EPA 8270
Indeno(1,2,3-cd)Pyrene	**	mg/Kg	EPA 8270
Dibenz(a,h)Anthracene	**	mg/Kg	EPA 8270
Benzo(g,h,i)Perylene	**	mg/Kg	EPA 8270

* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

SM 11/30/94

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

REPORT of ANALYSIS

Chemlab Ref.# :93.4627-15
Client Sample ID :BRW-~~AOC2~~-2S08 BARROW
SS03
Matrix :SOIL

Client Name	:ICF KAISER ENGINEERING	WORK Order	:70637
Ordered By	:RAY MORRIS	Report Completed	:10/05/93
Project Name	:DEW LINE RI/FS BARROW	Collected	:09/06/93 @ 16:00 hrs.
Project#	:41096-412-01	Received	:09/07/93 @ 11:00 hrs.
PWSID	:UA	Technical Director	:STEPHEN C. EDE
		Released By	: C. Homestead

Sample Remarks: SAMPLE COLLECTED BY: S.M. AND J.P. 88.7 MG/KG OF PATTERN IS NOT CONSISTENT WITH MIDDLE DISTILLATE FUEL.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Percent Solids	79.4		%	SM17 2540G			09/08	EAL
Hydrocarbons EPH	109	D	mg/Kg	3510/3550/8100M		09/14	09/18	JBH
Hydrocarbons VPH	0.799		mg/Kg	EPA 5030/8015M		09/08	09/10	WLS

* = See Special Instructions Above
See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

Gmf 11.30.94

REPORT of ANALYSIS

Chemlab Ref.# :93.4627-16
Client Sample ID :BRW-~~AOC2~~-2S09 BARROW
Matrix :SOIL SS023

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70637
Report Completed :10/05/93
Collected :09/06/93 @ 16:10 hrs.
Received :09/07/93 @ 11:00 hrs.
Technical Director:STEPHEN C. EDE
Released By : C. Homestead

Sample Remarks: SAMPLE COLLECTED BY: S.M. AND J.P. PATTERN IS NOT CONSISTENT WITH MIDDLE DISTILLATE FUEL.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Percent Solids	85.4		%	SM17 2540G			09/08	EAL
Hydrocarbons EPH	8.49		mg/Kg	3510/3550/8100M		09/14	09/17	JBH
Hydrocarbons VPH	3.19		mg/Kg	EPA 5030/8015M		09/08	09/10	WLS
Volatile Organics				EPA 8260				
Benzene	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MCM
Bromobenzene	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MCM
Bromochloromethane	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MCM
Bromodichloromethane	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MC
Bromoform	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MC
Bromomethane	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MCM
n-Butylbenzene	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MCM
sec-Butylbenzene	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MCM
tert-Butylbenzne	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MCM
Carbon Tetrachloride	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MCM
Chlorobenzene	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MCM
Chloroethane	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MCM
Chloroform	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MCM
Chloromethane	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MCM
2-Chlorotoluene	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MCM
4-Chlorotoluene	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MCM
Dibromochloromethane	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MCM
12Dibromo3Chloropropane	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MCM
1,2-Dibromoethane	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MCM
Dibromomethane	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MCM
1,2-Dichlorobenzene	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MCM
1,3-Dichlorobenzene	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MCM
1,4-Dichlorobenzene	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MCM
Dichlorodifluoromethane	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MCM
1,1-Dichloroethane	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MCM
1,2-Dichloroethane	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MCM
1,1-Dichloroethene	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MCM
cis-1,2-Dichloroethene	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MCM
trans1,2-Dichloroethene	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MCM
1,2-Dichloropropane	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MCM
1,3-Dichloropropane	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MCM
2,2-Dichloropropane	0.025	U	mg/Kg	EPA 8260		09/08	10/02	MC

COMMERCIAL TESTING & ENGINEERING CO.

ENVIRONMENTAL LABORATORY SERVICES

GMt 11-30-94

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4627-16
Client Sample ID :BRW-~~AOC2~~-2S09 BARROW
Matrix :SOIL SS03

1,1-Dichloropropene	0.025	U	mg/Kg	EPA 8260	09/08	10/02	MCM
Ethylbenzene	0.025	U	mg/Kg	EPA 8260	09/08	10/02	MCM
Hexachlorobutadiene	0.025	U	mg/Kg	EPA 8260	09/08	10/02	MCM
Isopropylbenzene	0.025	U	mg/Kg	EPA 8260	09/08	10/02	MCM
p-Isopropyltoluene	0.025	U	mg/Kg	EPA 8260	09/08	10/02	MCM
Methylene Chloride	0.025	U	mg/Kg	EPA 8260	09/08	10/02	MCM
Napthalene	0.025	U	mg/Kg	EPA 8260	09/08	10/02	MCM
n-Propylbenzene	0.025	U	mg/Kg	EPA 8260	09/08	10/02	MCM
Styrene	0.025	U	mg/Kg	EPA 8260	09/08	10/02	MCM
1112-Tetrachloroethane	0.025	U	mg/Kg	EPA 8260	09/08	10/02	MCM
1122-Tetrachloroethane	0.025	U	mg/Kg	EPA 8260	09/08	10/02	MCM
Tetrachloroethene	0.025	U	mg/Kg	EPA 8260	09/08	10/02	MCM
Toluene	0.025	U	mg/Kg	EPA 8260	09/08	10/02	MCM
1,2,3-Trichlorobenzene	0.025	U	mg/Kg	EPA 8260	09/08	10/02	MCM
1,2,4-Trichlorobenzene	0.025	U	mg/Kg	EPA 8260	09/08	10/02	MCM
1,1,1-Trichloroethane	0.025	U	mg/Kg	EPA 8260	09/08	10/02	MCM
1,1,2-Trichloroethane	0.025	U	mg/Kg	EPA 8260	09/08	10/02	MCM
Trichloroethene	0.025	U	mg/Kg	EPA 8260	09/08	10/02	MCM
Trichlorofluoromethane	0.025	U	mg/Kg	EPA 8260	09/08	10/02	MCM
1,2,3-Trichloropropane	0.025	U	mg/Kg	EPA 8260	09/08	10/02	MCM
1,2,4-Trimethylbenzene	0.025	U	mg/Kg	EPA 8260	09/08	10/02	MCM
1,3,5-Trimethylbenzene	0.025	U	mg/Kg	EPA 8260	09/08	10/02	MCM
Vinyl Chloride	0.025	U	mg/Kg	EPA 8260	09/08	10/02	MCM
p+m-Xylene	0.025	U	mg/Kg	EPA 8260	09/08	10/02	MCM
o-Xylene	0.025	U	mg/Kg	EPA 8260	09/08	10/02	MCM

* See Special Instructions Above
See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.

ENVIRONMENTAL LABORATORY SERVICES

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

REPORT of ANALYSIS

Chemlab Ref.# :93.4627-17
Client Sample ID :BRW-~~AOC2~~ SS03 -2S09 BARROW SPIKE
Matrix :SOIL
SM 12.6.95

Client Name	:ICF KAISER ENGINEERING	WORK Order	:70637	
Ordered By	:RAY MORRIS	Report Completed	:10/05/93	
Project Name	:DEW LINE RI/FS BARROW	Collected	:09/06/93	@ 16:10 hrs.
Project#	:41096-412-01	Received	:09/07/93	@ 11:00 hrs.
PWSID	:UA	Technical Director	:STEPHEN C. EDE	
		Released By	: C. Homestead	

Sample Remarks: SAMPLE COLLECTED BY: S.M. AND J.P. SEE QC PACKAGE FOR SPIKE RECOVERY AND % RSD.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Volatile Organics				EPA 8260				
Benzene	0.424		mg/Kg	EPA 8260		09/08	09/22	MCM
Bromobenzene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Bromochloromethane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Bromodichloromethane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Bromoform	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Bromomethane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
n-Butylbenzene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
sec-Butylbenzene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	M[illegible]
tert-Butylbenzne	0.025	U	mg/Kg	EPA 8260		09/08	09/22	[illegible]
Carbon Tetrachloride	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Chlorobenzene	0.426		mg/Kg	EPA 8260		09/08	09/22	MCM
Chloroethane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Chloroform	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Chloromethane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
2-Chlorotoluene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
4-Chlorotoluene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Dibromochloromethane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
12Dibromo3Chloropropane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,2-Dibromoethane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Dibromomethane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,2-Dichlorobenzene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,3-Dichlorobenzene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,4-Dichlorobenzene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Dichlorodifluoromethane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,1-Dichloroethane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,2-Dichloroethane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,1-Dichloroethene	0.266		mg/Kg	EPA 8260		09/08	09/22	MCM
cis-1,2-Dichloroethene	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
trans1,2-Dichloroethene	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,2-Dichloropropane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,3-Dichloropropane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
2,2-Dichloropropane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,1-Dichloropropene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Ethylbenzene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Hexachlorobutadiene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Isopropylbenzene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	[illegible]

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

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REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4627-17
Client Sample ID :BRW-~~AOC2~~-2S09 BARROW SPIKE
Matrix :SOIL SS03 SMP 12.6.95

p-Isopropyltoluene	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
Methylene Chloride	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
Napthalene	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
n-Propylbenzene	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
Styrene	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
1112-Tetrachloroethane	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
1122-Tetrachloroethane	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
Tetrachloroethene	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
Toluene	0.444		mg/Kg	EPA 8260	09/08	09/22	MCM
1,2,3-Trichlorobenzene	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
1,2,4-Trichlorobenzene	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
1,1,1-Trichloroethane	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
1,1,2-Trichloroethane	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
Trichloroethene	0.420		mg/Kg	EPA 8260	09/08	09/22	MCM
Trichlorofluoromethane	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
1,2,3-Trichloropropane	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
1,2,4-Trimethylbenzene	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
1,3,5-Trimethylbenzene	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
Vinyl Chloride	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
p+m-Xylene	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
o-Xylene	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM

* See Special Instructions Above
See Sample Remarks Above
= Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4627-18
Client Sample ID :BRW-~~AOC2~~-2S09 BARROW SPIKE DUPLICATE
Matrix :SOIL SS03
Smf 12.6.95

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70637
Report Completed :10/05/93
Collected :09/06/93 @ 16:10 hrs.
Received :09/07/93 @ 11:00 hrs.
Technical Director:STEPHEN C. EDE
Released By : C. Homestead

Sample Remarks: SAMPLE COLLECTED BY: S.M. AND J.P.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Volatile Organics				EPA 8260				
Benzene	0.457		mg/Kg	EPA 8260		09/08	09/22	MCM
Bromobenzene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Bromochloromethane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Bromodichloromethane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Bromoform	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Bromomethane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
n-Butylbenzene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
sec-Butylbenzene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
tert-Butylbenzne	0.025	U	mg/Kg	EPA 8260		09/08	09/22	[illegible]
Carbon Tetrachloride	0.025	U	mg/Kg	EPA 8260		09/08	09/22	[illegible]
Chlorobenzene	0.472		mg/Kg	EPA 8260		09/08	09/22	MCM
Chloroethane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Chloroform	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Chloromethane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
2-Chlorotoluene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
4-Chlorotoluene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Dibromochloromethane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
12Dibromo3Chloropropane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,2-Dibromoethane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Dibromomethane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,2-Dichlorobenzene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,3-Dichlorobenzene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,4-Dichlorobenzene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Dichlorodifluoromethane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,1-Dichloroethane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,2-Dichloroethane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,1-Dichloroethene	0.297		mg/Kg	EPA 8260		09/08	09/22	MCM
cis-1,2-Dichloroethene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
trans1,2-Dichloroethene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,2-Dichloropropane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,3-Dichloropropane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
2,2-Dichloropropane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,1-Dichloropropene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Ethylbenzene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Hexachlorobutadiene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Isopropylbenzene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
p-Isopropyltoluene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	[illegible]

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4627-18
Client Sample ID :BRW-~~AOC2~~ SS03 -2S09 BARROW SPIKE DUPLICATE
Matrix :SOIL
8ULt 12.6.95

Methylene Chloride	0.025	U	mg/Kg	EPA 8260	09/08 09/22	MCM
Napthalene	0.025	U	mg/Kg	EPA 8260	09/08 09/22	MCM
n-Propylbenzene	0.025	U	mg/Kg	EPA 8260	09/08 09/22	MCM
Styrene	0.025	U	mg/Kg	EPA 8260	09/08 09/22	MCM
1112-Tetrachloroethane	0.025	U	mg/Kg	EPA 8260	09/08 09/22	MCM
1122-Tetrachloroethane	0.025	U	mg/Kg	EPA 8260	09/08 09/22	MCM
Tetrachloroethene	0.025	U	mg/Kg	EPA 8260	09/08 09/22	MCM
Toluene	0.485		mg/Kg	EPA 8260	09/08 09/22	MCM
1,2,3-Trichlorobenzene	0.025	U	mg/Kg	EPA 8260	09/08 09/22	MCM
1,2,4-Trichlorobenzene	0.025	U	mg/Kg	EPA 8260	09/08 09/22	MCM
1,1,1-Trichloroethane	0.025	U	mg/Kg	EPA 8260	09/08 09/22	MCM
1,1,2-Trichloroethane	0.025	U	mg/Kg	EPA 8260	09/08 09/22	MCM
Trichloroethene	0.449		mg/Kg	EPA 8260	09/08 09/22	MCM
Trichlorofluoromethane	0.025	U	mg/Kg	EPA 8260	09/08 09/22	MCM
1,2,3-Trichloropropane	0.025	U	mg/Kg	EPA 8260	09/08 09/22	MCM
1,2,4-Trimethylbenzene	0.025	U	mg/Kg	EPA 8260	09/08 09/22	MCM
1,3,5-Trimethylbenzene	0.025	U	mg/Kg	EPA 8260	09/08 09/22	MCM
Vinyl Chloride	0.025	U	mg/Kg	EPA 8260	09/08 09/22	MCM
p+m-Xylene	0.025	U	mg/Kg	EPA 8260	09/08 09/22	MCM
o-Xylene	0.025	U	mg/Kg	EPA 8260	09/08 09/22	MCM

* = See Special Instructions Above
See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES
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8ML-11-3094

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4627-19
Client Sample ID :BRW-~~AOC2~~-2S10 BARROW
Matrix :SOIL SS03

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70637
Report Completed :10/05/93
Collected :09/06/93 @ 16:20 hrs.
Received :09/07/93 @ 11:00 hrs.
Technical Director:STEPHEN C. EDE
Released By : C. Homestead

Sample Remarks: SAMPLE COLLECTED BY: S.M. AND J.P. PATTERN IS NOT CONSISTENT WITH MIDDLE DISTILLATE FUEL.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Percent Solids	90.2		%	SM17 2540G			09/08	EAL
Hydrocarbons EPH	7.21		mg/Kg	3510/3550/8100M		09/14	09/18	JBH
Hydrocarbons VPH	0.400	U	mg/Kg	EPA 5030/8015M		09/08	09/10	WLS
Volatile Organics				EPA 8260				
Benzene	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Bromobenzene	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Bromochloromethane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Bromodichloromethane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	M
Bromoform	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Bromomethane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
n-Butylbenzene	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
sec-Butylbenzene	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
tert-Butylbenzne	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Carbon Tetrachloride	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Chlorobenzene	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Chloroethane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Chloroform	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Chloromethane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
2-Chlorotoluene	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
4-Chlorotoluene	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Dibromochloromethane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
12Dibromo3Chloropropane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,2-Dibromoethane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Dibromomethane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,2-Dichlorobenzene	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,3-Dichlorobenzene	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,4-Dichlorobenzene	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Dichlorodifluoromethane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,1-Dichloroethane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,2-Dichloroethane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,1-Dichloroethene	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
cis-1,2-Dichloroethene	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
trans1,2-Dichloroethene	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,2-Dichloropropane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,3-Dichloropropane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	MCM
2,2-Dichloropropane	0.020	U	mg/Kg	EPA 8260		09/08	09/22	M

COMMERCIAL TESTING & ENGINEERING CO.

ENVIRONMENTAL LABORATORY SERVICES

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SMH 11-30-94

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4627-19
Client Sample ID :BRW-~~AOC2~~-2S10 BARROW
Matrix :SOIL SS03

1,1-Dichloropropene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MCM
Ethylbenzene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MCM
Hexachlorobutadiene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MCM
Isopropylbenzene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MCM
p-Isopropyltoluene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MCM
Methylene Chloride	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MCM
Napthalene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MCM
n-Propylbenzene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MCM
Styrene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MCM
1112-Tetrachloroethane	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MCM
1122-Tetrachloroethane	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MCM
Tetrachloroethene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MCM
Toluene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MCM
1,2,3-Trichlorobenzene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MCM
1,2,4-Trichlorobenzene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MCM
1,1,1-Trichloroethane	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MCM
1,1,2-Trichloroethane	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MCM
Trichloroethene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MCM
Trichlorofluoromethane	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MCM
1,2,3-Trichloropropane	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MCM
1,2,4-Trimethylbenzene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MCM
1,3,5-Trimethylbenzene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MCM
Vinyl Chloride	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MCM
p+m-Xylene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MCM
o-Xylene	0.020	U	mg/Kg	EPA 8260	09/08	09/22	MCM

* See Special Instructions Above
See Sample Remarks Above
Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

5633 B STREET
ANCHORAGE. AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

SAK 11-30-94

REPORT of ANALYSIS

Chemlab Ref.# :93.4627-20
Client Sample ID :BRW-~~A0C2~~-2S11 BARROW SS03
Matrix :SOIL

Client Name	:ICF KAISER ENGINEERING	WORK Order	:70637
Ordered By	:RAY MORRIS	Report Completed	:10/05/93
Project Name	:DEW LINE RI/FS BARROW	Collected	:09/06/93 @ 16:15 hrs.
Project#	:41096-412-01	Received	:09/07/93 @ 11:00 hrs.
PWSID	:UA	Technical Director	:STEPHEN C. EDE
		Released By	: C. Homestead

Sample Remarks: SAMPLE COLLECTED BY: S.M. AND J.P. EPH PATTERN IS NOT CONSISTENT WITH MIDDLE DISTILLATE FUEL.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Percent Solids	75.3		%	SM17 2540G			09/08	EAL
Hydrocarbons EPH	55.7	D	mg/Kg	3510/3550/8100M		09/14	09/18	JBH
Hydrocarbons VPH	0.600	U	mg/Kg	EPA 5030/8015M		09/08	09/10	WLS

* See Special Instructions Above	UA = Unavailable
** See Sample Remarks Above	NA = Not Analyzed
U = Undetected, Reported value is the practical quantification limit.	LT = Less Than
D = Secondary dilution.	GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.

ENVIRONMENTAL LABORATORY SERVICES

SMF 11-30-94

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REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4627-21
Client Sample ID :BRW-~~AOC2~~-2S12 BARROW
Matrix :SOIL SS03

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70637
Report Completed :10/05/93
Collected :09/06/93 @ 16:30 hrs.
Received :09/07/93 @ 11:00 hrs.
Technical Director:STEPHEN C. EDE
Released By : C. Homestead

Sample Remarks: SAMPLE COLLECTED BY: S.M. AND J.P. EPH PATTERN IS NOT CONSISTENT WITH MIDDLE DISTILLATE FUEL.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Percent Solids	80.2		%	SM17 2540G			09/08	EAL
Hydrocarbons EPH	29.5		mg/Kg	3510/3550/8100M		09/14	09/22	JBH
VPH & BTEX				EPA 8015M/8020				
Hydrocarbons VPH	3.30		mg/Kg	EPA 5030/8015m		09/08	09/11	WLS
Benzene	0.025	U	mg/Kg	EPA 8020		09/08	09/11	WLS
Toluene	0.025	U	mg/Kg	EPA 8020		09/08	09/11	WLS
Ethylbenzene	0.038		mg/Kg	EPA 8020		09/08	09/11	WLS
p&m Xylene	0.243		mg/Kg	EPA 8020		09/08	09/11	WLS
o-Xylene	0.132		mg/Kg	EPA 8020		09/08	09/11	WLS
Volatile Organics				EPA 8260				
Benzene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Bromobenzene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Bromochloromethane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Bromodichloromethane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Bromoform	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Bromomethane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
n-Butylbenzene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
sec-Butylbenzene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
tert-Butylbenzne	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Carbon Tetrachloride	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Chlorobenzene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Chloroethane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Chloroform	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Chloromethane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
2-Chlorotoluene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
4-Chlorotoluene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Dibromochloromethane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
12Dibromo3Chloropropane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,2-Dibromoethane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Dibromomethane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,2-Dichlorobenzene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,3-Dichlorobenzene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
1,4-Dichlorobenzene	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM
Dichlorodifluoromethane	0.025	U	mg/Kg	EPA 8260		09/08	09/22	MCM

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES
SINCE 1908

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

SAK 11-30-94

REPORT of ANALYSIS

Chemlab Ref.# :93.4627-21
Client Sample ID :BRW-~~AQCZ~~ SS03-2S12 BARROW
Matrix :SOIL

1,1-Dichloroethane	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
1,2-Dichloroethane	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
1,1-Dichloroethene	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
cis-1,2-Dichloroethene	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
trans1,2-Dichloroethene	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
1,2-Dichloropropane	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
1,3-Dichloropropane	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
2,2-Dichloropropane	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
1,1-Dichloropropene	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
Ethylbenzene	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
Hexachlorobutadiene	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
Isopropylbenzene	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
p-Isopropyltoluene	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
Methylene Chloride	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
Napthalene	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
n-Propylbenzene	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
Styrene	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
1112-Tetrachloroethane	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
1122-Tetrachloroethane	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
Tetrachloroethene	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
Toluene	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
1,2,3-Trichlorobenzene	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
1,2,4-Trichlorobenzene	0.025	U	mg/Kg	EPA 8260	09/08	09/22	M[illegible]
1,1,1-Trichloroethane	0.025	U	mg/Kg	EPA 8260	09/08	09/22	M[illegible]
1,1,2-Trichloroethane	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
Trichloroethene	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
Trichlorofluoromethane	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
1,2,3-Trichloropropane	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
1,2,4-Trimethylbenzene	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
1,3,5-Trimethylbenzene	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
Vinyl Chloride	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
p+m-Xylene	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM
o-Xylene	0.025	U	mg/Kg	EPA 8260	09/08	09/22	MCM

==

* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

SGL #3094

SINCE 1908

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4397-8
Client Sample ID :BRW-~~AOC2~~-SD07 BARROW
Matrix :SOIL SS03

Client Name	:ICF KAISER ENGINEERING	WORK Order	:70163
Ordered By	:RAY MORRIS	Report Completed	:10/15/93
Project Name	:DEW LINE RI/FS BARROW	Collected	:08/26/93 @ 18:00 hrs.
Project#	:41096-412-01	Received	:08/28/93 @ 09:35 hrs.
PWSID	:UA	Technical Director	:STEPHEN C. EDE
		Released By	: C. Homestead

Sample Remarks: SAMPLE COLLECTED BY: S.S. SEPPOVEN. HIGH DETECTION LIMIT ON 8270 DUE TO THE FACT THAT THE EXTRACT WAS BLACK AFTER CONCENTRATION. 8260 SAMPLE WAS OVER HOLD TIME AND NOT ANALYZED AS PER CLIENT. J = INDICATES AN ANALYTE WHOSE CONCENTRATION IS ESTIMATED BECAUSE THE ANALYTE'S CONCENTRATION IS DETECTED BELOW THE CALIBRATION RANGE.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Semivolatile Organics				EPA 8270				
Phenol	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
bis(2-Chloroethyl)ether	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
2-Chlorophenol	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
1,3-Dichlorobenzene	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
1,4-Dichlorobenzene	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
Benzyl Alcohol	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
1,2-Dichlorobenzene	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
2-Methylphenol	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
bis(2-Chloroisopropyl)e	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
4-Methylphenol	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
n-Nitroso-di-n-Propylam	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
Hexachloroethane	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
Nitrobenzene	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
Isophorone	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
2-Nitrophenol	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
2,4-Dimethylphenol	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
Benzoic Acid	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
bis(2-Chloroethoxy)Meth	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
2,4-Dichlorophenol	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
1,2,4-Trichlorobenzene	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
Naphthalene	1.87	J	mg/Kg	EPA 8270		09/09	10/09	GV
4-Chloroaniline	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
Hexachlorobutadiene	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
4-Chloro-3-Methylphenol	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
2-Methylnaphthalene	2.58		mg/Kg	EPA 8270		09/09	10/09	GV
Hexachlorocyclopentadie	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
2,4,6-Trichlorophenol	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
2,4,5-Trichlorophenol	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
2-Chloronaphthalene	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
2-Nitroaniline	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
Dimethylphthalate	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
Acenaphthylene	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
2,6-Dinitrotoluene	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

SINCE 1908

SMK 11-30-94

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4397-8
Client Sample ID :BRW-~~A0CZ~~-SD07 SS03 BARROW
Matrix :SOIL

3-Nitroaniline	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
Acenaphthene	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
2,4-Dinitrophenol	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
4-Nitrophenol	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
Dibenzofuran	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
2,4-Dinitrotoluene	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
Diethylphthalate	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
4-Chlorophenyl-Phenylet	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
Fluorene	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
4-Nitroaniline	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
4,6-Dinitro-2-Methylphe	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
n-Nitrosodiphenylamine	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
4-Bromophenyl-Phenyleth	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
Hexachlorobenzene	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
Pentachlorophenol	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
Phenanthrene	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
Anthracene	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
di-n-Butylphthalate	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
Fluoranthene	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
Pyrene	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
Butylbenzylphthalate	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
3,3-Dichlorobenzidine	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
Benzo(a)Anthracene	2.50	U	mg/Kg	EPA 8270		09/09	10/09	[illegible]
Chrysene	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
bis(2-Ethylhexyl)Phthal	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
di-n-Octylphthalate	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
Benzo(b)Fluoranthene	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
Benzo(k)Fluoranthene	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
Benzo(a)Pyrene	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
Indeno(1,2,3-cd)Pyrene	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
Dibenz(a,h)Anthracene	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
Benzo(g,h,i)Perylene	2.50	U	mg/Kg	EPA 8270		09/09	10/09	GV
Sample Preparation	---			EPA 3050 Digest				
Total Metals Analysis	---			-				
ICP Screen, ICF				EPA	n/a			
Aluminum	1900		mg/Kg	EPA 6010		08/31	09/02	DLG
Antimony	65	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Arsenic	65	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Barium	67		mg/Kg	EPA 6010		08/31	09/02	DLG
Beryllium	3.2	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Cadmium	3.2	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Calcium	2200		mg/Kg	EPA 6010		08/31	09/02	DLG
Chromium	25		mg/Kg	EPA 6010		08/31	09/02	DLG
Cobalt	6.5	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Copper	4.3		mg/Kg	EPA 6010		08/31	09/02	DLG
Iron	9000		mg/Kg	EPA 6010		08/31	09/02	DLG
Lead	140		mg/Kg	EPA 6010		08/31	09/02	DLG
Magnesium	1500		mg/Kg	EPA 6010		08/31	09/02	DLG
Manganese	30		mg/Kg	EPA 6010		08/31	09/02	DLG
Molybdenum	3.2	U	mg/Kg	EPA 6010		08/31	09/02	DL

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES
SINCE 1908

soil 11-30-94

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4397-8
Client Sample ID :BRW-~~A0C2~~-SD07 BARROW
Matrix :SOIL SS03

		Qualifier		Comment				
Nickel	5.4		mg/Kg		EPA 6010	08/31	09/02	DLG
Potassium	610		mg/Kg		EPA 6010	08/31	09/06	DLG
Selenium	65	U	mg/Kg		EPA 6010	08/31	09/02	DLG
Silver	32	U J	mg/Kg	J.1	EPA 6010	08/31	09/02	DLG
Sodium	200		mg/Kg		EPA 6010	08/31	09/06	DLG
Thallium	0.32	U	mg/Kg		EPA 7841	08/30	09/01	KAW
Vanadium	13		mg/Kg		EPA 6010	08/30	09/01	DLG
Zinc	56		mg/Kg		EPA 6010	08/30	09/01	DLG
TOC, Soil	5160		mg/Kg		PSEP Ref Lab			

All chges s.c 2/15/94.

* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

SINCE 1908

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

REPORT of ANALYSIS

Chemlab Ref.# :93.4397-9
Client Sample ID :BRW-~~AOC2~~-SD08 BARROW
SS03
Matrix :SOIL

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70163
Report Completed :10/15/93
Collected :08/26/93 @ 18:00 hrs.
Received :08/28/93 @ 09:35 hrs.
Technical Director:STEPHEN C. EDE
Released By :

Sample Remarks: SAMPLE COLLECTED BY: S.S. SEPPOVEN. HIGH DETECTION LIMIT ON 8270 DUE TO THE FACT THAT THE EXTRACT WAS BLACK AFTER CONCENTRATION. 8260 SAMPLE WAS OVER HOLD TIME AND NOT ANALYZED AS PER CLIENT.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Semivolatile Organics				EPA 8270				
Phenol	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
bis(2-Chloroethyl)ether	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
2-Chlorophenol	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
1,3-Dichlorobenzene	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
1,4-Dichlorobenzene	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
Benzyl Alcohol	2.30	U	mg/Kg	EPA 8270		09/09	10/09	[illegible]
1,2-Dichlorobenzene	2.30	U	mg/Kg	EPA 8270		09/09	10/09	[illegible]
2-Methylphenol	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
bis(2-Chloroisopropyl)e	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
4-Methylphenol	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
n-Nitroso-di-n-Propylam	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
Hexachloroethane	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
Nitrobenzene	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
Isophorone	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
2-Nitrophenol	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
2,4-Dimethylphenol	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
Benzoic Acid	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
bis(2-Chloroethoxy)Meth	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
2,4-Dichlorophenol	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
1,2,4-Trichlorobenzene	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
Naphthalene	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
4-Chloroaniline	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
Hexachlorobutadiene	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
4-Chloro-3-Methylphenol	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
2-Methylnaphthalene	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
Hexachlorocyclopentadie	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
2,4,6-Trichlorophenol	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
2,4,5-Trichlorophenol	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
2-Chloronaphthalene	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
2-Nitroaniline	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
Dimethylphthalate	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
Acenaphthylene	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
2,6-Dinitrotoluene	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
3-Nitroaniline	2.30	U	mg/Kg	EPA 8270		09/09	10/09	[illegible]
Acenaphthene	2.30	U	mg/Kg	EPA 8270		09/09	10/09	[illegible]

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES
SINCE 1908

SMK 11-30-94

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4397-9
Client Sample ID :BRW-~~AOC2~~-SD08 BARROW
Matrix :SOIL SS03

2,4-Dinitrophenol	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
4-Nitrophenol	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
Dibenzofuran	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
2,4-Dinitrotoluene	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
Diethylphthalate	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
4-Chlorophenyl-Phenylet	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
Fluorene	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
4-Nitroaniline	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
4,6-Dinitro-2-Methylphe	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
n-Nitrosodiphenylamine	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
4-Bromophenyl-Phenyleth	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
Hexachlorobenzene	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
Pentachlorophenol	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
Phenanthrene	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
Anthracene	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
di-n-Butylphthalate	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
Fluoranthene	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
Pyrene	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
Butylbenzylphthalate	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
3,3-Dichlorobenzidine	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
Benzo(a)Anthracene	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
Chrysene	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
bis(2-Ethylhexyl)Phthal	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
di-n-Octylphthalate	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
Benzo(b)Fluoranthene	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
Benzo(k)Fluoranthene	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
Benzo(a)Pyrene	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
Indeno(1,2,3-cd)Pyrene	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
Dibenz(a,h)Anthracene	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
Benzo(g,h,i)Perylene	2.30	U	mg/Kg	EPA 8270		09/09	10/09	GV
Sample Preparation	---			EPA 3050 Digest				
Total Metals Analysis	---			-				
ICP Screen, ICF				EPA	n/a			
Aluminum	800		mg/Kg	EPA 6010		08/31	09/02	DLG
Antimony	58	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Arsenic	9.7		mg/Kg	EPA 6010		08/31	09/02	DLG
Barium	44		mg/Kg	EPA 6010		08/31	09/02	DLG
Beryllium	2.9	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Cadmium	2.9	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Calcium	760		mg/Kg	EPA 6010		08/31	09/02	DLG
Chromium	6.2		mg/Kg	EPA 6010		08/31	09/02	DLG
Cobalt	5.8	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Copper	2.9	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Iron	4700		mg/Kg	EPA 6010		08/31	09/02	DLG
Lead	47		mg/Kg	EPA 6010		08/31	09/02	DLG
Magnesium	370		mg/Kg	EPA 6010		08/31	09/02	DLG
Manganese	19		mg/Kg	EPA 6010		08/31	09/02	DLG
Molybdenum	2.9	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Nickel	2.9	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Potassium	330		mg/Kg	EPA 6010		08/31	09/02	DLG

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5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

SMK 11-30-94

REPORT of ANALYSIS

Chemlab Ref.# :93.4397-9
Client Sample ID :BRW-~~A0C2~~-SD08 BARROW SS03
Matrix :SOIL

Selenium	58	U	mg/Kg	EPA 6010	08/31	09/02	DLG
Silver	29	U	mg/Kg	EPA 6010	08/31	09/02	DLG
Sodium	120		mg/Kg	EPA 6010	08/31	09/02	DLG
Thallium	0.29	U	mg/Kg	EPA 7841	08/30	09/01	KAW
Vanadium	6.7		mg/Kg	EPA 6010	08/31	09/02	DLG
Zinc	23		mg/Kg	EPA 6010	08/31	09/02	DLG
TOC, Soil	4870		mg/Kg	PSEP Ref Lab			

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* See Special Instructions Above
** See Sample Remarks Above
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LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.

ENVIRONMENTAL LABORATORY SERVICES

SMK 11-30-94

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4627-11
Client Sample ID :BRW-~~AOC2~~-2SD09 BARROW
Matrix :SOIL SS03

Client Name	:ICF KAISER ENGINEERING	WORK Order	:70637
Ordered By	:RAY MORRIS	Report Completed	:10/05/93
Project Name	:DEW LINE RI/FS BARROW	Collected	:09/06/93 @ 16:00 hrs.
Project#	:41096-412-01	Received	:09/07/93 @ 11:00 hrs.
PWSID	:UA	Technical Director	:STEPHEN C. EDE
		Released By	: C. Homestead

Sample Remarks: SAMPLE COLLECTED BY: S.M. AND J.P. 54.9 MG/KG OF PATTERN IS NOT CONSISTENT WITH MIDDLE DISTILLATE FUEL.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Percent Solids	80.6		%	SM17 2540G			09/08	EAL
Hydrocarbons EPH	195	D	mg/Kg	3510/3550/8100M		09/14	09/17	JBH
VPH & BTEX				EPA 8015M/8020				
Hydrocarbons VPH	0.500	U	mg/Kg	EPA 5030/8015m		09/08	09/10	WLS
Benzene	0.025	U	mg/Kg	EPA 8020		09/08	09/10	WLS
Toluene	0.025	U	mg/Kg	EPA 8020		09/08	09/10	WLS
Ethylbenzene	0.025	U	mg/Kg	EPA 8020		09/08	09/10	WLS
p&m Xylene	0.025	U	mg/Kg	EPA 8020		09/08	09/10	WLS
o-Xylene	0.025	U	mg/Kg	EPA 8020		09/08	09/10	WLS

* See Special Instructions Above
See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
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LT = Less Than
GT = Greater Than

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ENVIRONMENTAL LABORATORY SERVICES

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

REPORT of ANALYSIS

Chemlab Ref.# :93.4627-12
Client Sample ID :BRW-~~AOC2~~-2SD09 BARROW SPIKE
Matrix :SOIL SS03 SMP 12.645

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70637
Report Completed :10/05/93
Collected :09/06/93 @ 16:00 hrs.
Received :09/07/93 @ 11:00 hrs.
Technical Director:STEPHEN C. EDE
Released By : C. Homestead

Sample Remarks: SAMPLE COLLECTED BY: S.M. AND J.P. FOR SPIKING CONCENTRATIONS & PERCENT RECOVERIES SEE QA/QC PACKAGE. 53.7 MG/KG OF PATTERN IS NOT CONSISTENT WITH MIDDLE DISTILLATE FUEL.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Percent Solids	80.6		%	SM17 2540G			09/08	EAL
Hydrocarbons EPH	224	D	mg/Kg	3510/3550/8100M		09/14	09/17	JBH
VPH & BTEX				EPA 8015M/8020				
Hydrocarbons VPH	13.6		mg/Kg	EPA 5030/8015m		09/08	09/10	WLS
Benzene	0.211		mg/Kg	EPA 8020		09/08	09/10	WLS
Toluene	1.17		mg/Kg	EPA 8020		09/08	09/10	W
Ethylbenzene	0.232		mg/Kg	EPA 8020		09/08	09/10	W
p&m Xylene	0.881		mg/Kg	EPA 8020		09/08	09/10	WLS
o-Xylene	0.356		mg/Kg	EPA 8020		09/08	09/10	WLS

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UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

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5633 B STREET
ANCHORAGE, AK 99518
TEL. (907) 562-2343
FAX (907) 561-5301

REPORT of ANALYSIS

Chemlab Ref.# :93.4627-13
Client Sample ID :BRW-~~AOC2~~-2SD09 BARROW SPIKE DUPLICATE
Matrix :SOIL SS03
SWK
12.6.95

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70637
Report Completed :10/05/93
Collected :09/06/93 @ 16:00 hrs.
Received :09/07/93 @ 11:00 hrs.
Technical Director:STEPHEN C. EDE
Released By : C. Homestead

Sample Remarks: SAMPLE COLLECTED BY: S.M. AND J.P. FOR SPIKING CONCENTRATIONS & PERCENT RECOVERIES SEE QA/QC PACKAGE. 49.6 MG/KG OF PATTERN IS NOT CONSISTENT WITH MIDDLE DISTILLATE FUEL.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Percent Solids	80.6		%	SM17 2540G			09/08	EAL
Hydrocarbons EPH	196	D	mg/Kg	3510/3550/8100M		09/14	09/17	JBH
VPH & BTEX				EPA 8015M/8020				
Hydrocarbons VPH	13.6		mg/Kg	EPA 5030/8015m		09/08	09/10	WLS

Benzene	0.212		mg/Kg	EPA 8020		09/08	09/10	WLS
Toluene	1.17		mg/Kg	EPA 8020		09/08	09/10	WLS
Ethylbenzene	0.230		mg/Kg	EPA 8020		09/08	09/10	WLS
p&m Xylene	0.874		mg/Kg	EPA 8020		09/08	09/10	WLS
o-Xylene	0.355		mg/Kg	EPA 8020		09/08	09/10	WLS

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Undetected, Reported value is the practical quantification limit.
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ON 11-30-94

REPORT of ANALYSIS

Chemlab Ref.# :93.4627-14
Client Sample ID :BRW-~~AOC2~~-2SD10 BARROW
Matrix :SOIL SS03

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70637
Report Completed :10/05/93
Collected :09/06/93 @ 16:05 hrs.
Received :09/07/93 @ 11:00 hrs.
Technical Director:STEPHEN C. EDE
Released By : C. Homestead

Sample Remarks: SAMPLE COLLECTED BY: S.M. AND J.P. 60.5 MG/KG OF EPH PATTERN IS NOT CONSISTENT WITH MIDDLE DISTILLATE FUEL.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Percent Solids	57.7		%	SM17 2540G			09/08	EAL
Hydrocarbons EPH	686	D	mg/Kg	3510/3550/8100M		09/14	09/17	JBH
VPH & BTEX				EPA 8015M/8020				
Hydrocarbons VPH	47.6		mg/Kg	EPA 5030/8015m		09/08	09/13	WLS

Benzene	0.120	U	mg/Kg	EPA 8020		09/08	09/13	WLS
Toluene	0.120	U	mg/Kg	EPA 8020		09/08	09/13	WLS
Ethylbenzene	0.330		mg/Kg	EPA 8020		09/08	09/13	W
p&m Xylene	0.767		mg/Kg	EPA 8020		09/08	09/13	W
o-Xylene	0.429		mg/Kg	EPA 8020		09/08	09/13	WLS

* See Special Instructions Above
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REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 9951
TEL: (907) 562-234
FAX: (907) 561-530

Chemlab Ref.# :93.4395-7
Client Sample ID :BRW-~~AOC2~~-SW04 BARROW
Matrix :WATER SS03

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70159
Report Completed :09/28/93
Collected :08/26/93 @ 17:00 hr
Received :08/28/93 @ 09:30 hr
Technical Director:STEPHEN C. EDE
Released By :

Sample Remarks: SAMPLE COLLECTED BY: D. NOE, JEFF J. DAWSON, AND S.S. SEPPOVEN.

Qualifier/Comment

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Ini
Volatile Organics				EPA 8260				
Benzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
Bromobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
Bromochloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
Bromodichloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
Bromoform	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
Bromomethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
n-Butylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
sec-Butylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
tert-Butylbenzne	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
Carbon Tetrachloride	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
Chlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
Chloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
Chloroform	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
Chloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
2-Chlorotoluene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
4-Chlorotoluene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
Dibromochloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
12Dibromo3Chloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
1,2-Dibromoethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
Dibromomethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
1,2-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
1,3-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
1,4-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
Dichlorodifluoromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
1,1-Dichloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
1,2-Dichloroethane	0.0010	U	mg/L	EPA 8260	(J) -J.1	09/03	09/03	MC
1,1-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
cis-1,2-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
trans1,2-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
1,2-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
1,3-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
2,2-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
1,1-Dichloropropene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
Ethylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
Hexachlorobutadiene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
Isopropylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC
p-Isopropyltoluene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MC

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SMT 11-20-94

REPORT of ANALYSIS ~~ECL~~

5633 B STREE
ANCHORAGE, AK 9951
TEL: (907) 562-234
FAX: (907) 561-530

Chemlab Ref.# :93.4395-7
Client Sample ID :BRW-~~AOC2~~-SW04 BARROW
Matrix :WATER SS03

Qualifiers/Comments

Methylene Chloride	0.0010	U	mg/L	EPA 8260	09/03	09/03	M(
Napthalene	0.0011		mg/L	EPA 8260 (J) - J.1	09/03	09/03	M(
n-Propylbenzene	0.0010	U	mg/L	EPA 8260	09/03	09/03	M(
Styrene	0.0010	U	mg/L	EPA 8260	09/03	09/03	M(
1112-Tetrachloroethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	M(
1122-Tetrachloroethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	M(
Tetrachloroethene	0.0010	U	mg/L	EPA 8260	09/03	09/03	M(
Toluene	0.0010	U	mg/L	EPA 8260	09/03	09/03	M(
1,2,3-Trichlorobenzene	0.0010	U	mg/L	EPA 8260	09/03	09/03	M(
1,2,4-Trichlorobenzene	0.0010	U	mg/L	EPA 8260	09/03	09/03	M(
1,1,1-Trichloroethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	M(
1,1,2-Trichloroethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	M(
Trichloroethene	0.0010	U	mg/L	EPA 8260	09/03	09/03	M(
Trichlorofluoromethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	M(
1,2,3-Trichloropropane	0.0010	U	mg/L	EPA 8260	09/03	09/03	M(
1,2,4-Trimethylbenzene	0.0027		mg/L	EPA 8260	09/03	09/03	M(
1,3,5-Trimethylbenzene	0.0034	U	mg/L	EPA 8260	09/03	09/03	M(
Vinyl Chloride	0.0010	U	mg/L	EPA 8260	09/03	09/03	M(
p+m-Xylene	0.0028		mg/L	EPA 8260	09/03	09/03	M(
o-Xylene	0.0038		mg/L	EPA 8260	09/03	09/03	M(

CCB
2-22-94

* See Special Instructions Above
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9AK 11:30 49

REPORT of ANALYSIS

Chemlab Ref.# :93.4396-1
Client Sample ID :BRW-~~AOC2~~-SW04 BARROW
SS03
Matrix :WATER

5533 B STREET
ANCHORAGE, AK 99518
TEL. (907) 562-2343
FAX: (907) 561-5301

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70161
Report Completed :09/28/93
Collected :08/26/93 @ 17:00 hrs
Received :08/28/93 @ 09:35 hrs
Technical Director:STEPHEN C. EDE
Released By :

Sample Remarks: SAMPLE COLLECTED BY: D. NOE.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Semivolatile Organics				EPA 8270				
Phenol	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
bis(2-Chloroethyl)ether	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
2-Chlorophenol	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
1,3-Dichlorobenzene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
1,4-Dichlorobenzene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Benzyl Alcohol	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
1,2-Dichlorobenzene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
2-Methylphenol	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
bis(2-Chloroisopropyl)e	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
4-Methylphenol	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
n-Nitroso-di-n-Propylam	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Hexachloroethane	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Nitrobenzene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Isophorone	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
2-Nitrophenol	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
2,4-Dimethylphenol	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Benzoic Acid	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
bis(2-Chloroethoxy)Meth	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
2,4-Dichlorophenol	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
1,2,4-Trichlorobenzene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Naphthalene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
4-Chloroaniline	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Hexachlorobutadiene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
4-Chloro-3-Methylphenol	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
2-Methylnaphthalene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Hexachlorocyclopentadie	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
2,4,6-Trichlorophenol	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
2,4,5-Trichlorophenol	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
2-Chloronaphthalene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
2-Nitroaniline	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Dimethylphthalate	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Acenaphthylene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
2,6-Dinitrotoluene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
3-Nitroaniline	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Acenaphthene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
2,4-Dinitrophenol	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
4-Nitrophenol	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT

COMMERCIAL TESTING & ENGINEERING CO.

ENVIRONMENTAL LABORATORY SERVICES

SINCE 1908

SMK 11.30.94

REPORT of ANALYSIS

5633 B STR
ANCHORAGE, AK 9
TEL: (907) 562-2
FAX: (907) 561-5301

Chemlab Ref.# :93.4396-1
Client Sample ID :BRW-~~AOC2~~-SW04 BARROW
Matrix :WATER SS03

Qualifier/Comments

Dibenzofuran	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
2,4-Dinitrotoluene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Diethylphthalate	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
4-Chlorophenyl-Phenylet	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Fluorene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
4-Nitroaniline	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
4,6-Dinitro-2-Methylphe	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
n-Nitrosodiphenylamine	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
4-Bromophenyl-Phenyleth	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Hexachlorobenzene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Pentachlorophenol	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Phenanthrene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Anthracene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
di-n-Butylphthalate	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Fluoranthene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Pyrene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Butylbenzylphthalate	0.011	U	mg/L	EPA 8270	(J)-D.1	09/01	09/04	MTT
3,3-Dichlorobenzidine	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Benzo(a)Anthracene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Chrysene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
bis(2-Ethylhexyl)Phthal	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
di-n-Octylphthalate	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Benzo(b)Fluoranthene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Benzo(k)Fluoranthene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Benzo(a)Pyrene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Indeno(1,2,3-cd)Pyrene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Dibenz(a,h)Anthracene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Benzo(g,h,i)Perylene	0.011	U	mg/L	EPA 8270				
Total Metals Analysis	---							
ICP Screen, ICF				EPA	n/a	09/06	09/10	DLG
Aluminum	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Antimony	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Arsenic	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Barium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Beryllium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Cadmium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Calcium	38		mg/L	EPA 6010		09/06	09/10	DLG
Chromium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Cobalt	0.1	U	mg/L	EPA 6010		09/06	09/10	DLG
Copper	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Iron	3.1		mg/L	EPA 6010		09/06	09/10	DLG
Lead	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Magnesium	35		mg/L	EPA 6010		09/06	09/10	DLG
Manganese	0.16		mg/L	EPA 6010		09/06	09/10	DLG
Molybdenum	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Nickel	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Potassium	5.9		mg/L	EPA 6010		09/06	09/10	DLG
Selenium	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Silver	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Sodium	100		mg/L	EPA 6010				

2-18.94

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES
SINCE 1908

Smt 11-30-94

REPORT of ANALYSIS

Chemlab Ref.# :93.4396-1
Client Sample ID :BRW-~~AOC2~~-SW04 BARROW
Matrix :WATER SS03

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Analytical Comment

Thallium	0.005	U	mg/L	EPA 7841		09/06	09/08	BMW
Vanadium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Zinc	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Dissolved Metals Analys	---			-				
ICP Screen, ICF				EPA	n/a			
Aluminum	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Antimony	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Arsenic	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Barium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Beryllium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Cadmium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Calcium	38		mg/L	EPA 6010		09/06	09/10	DLG
Chromium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Cobalt	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Copper	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Iron	0.37		mg/L	EPA 6010		09/06	09/10	DLG
Lead	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Magnesium	34		mg/L	EPA 6010		09/06	09/10	DLG
Manganese	0.14		mg/L	EPA 6010		09/06	09/10	DLG
Molybdenum	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Nickel	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Potassium	5.5		mg/L	EPA 6010		09/06	09/10	DLG
Selenium	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Silver	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Sodium	97		mg/L	EPA 6010		09/06	09/10	DLG
Thallium	0.0050	U	mg/L	EPA 7841		09/06	09/08	BMW
Vanadium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Zinc	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
TOC, Nonpurgable				EPA 9060	n/a	-		
...TOC Range	15.0-16.4		mg/L	EPA 9060			09/08	CMF
...TOC Concentration	16.0		mg/L	EPA 9060			09/08	CMF
Residue, Non-Filterable	12		mg/L	EPA 160.2		09/02	09/02	GPF
Residue,Filterable(TDS)	698		mg/L	EPA 160.1 (J)-A.I	500		09/07	RJH

CAS
2-18-94

* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.

ENVIRONMENTAL LABORATORY SERVICES

SMH 11-30-94

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4395-8
Client Sample ID :BRW-~~AOC2~~-SW07 BARROW
Matrix :WATER SS23

Client Name	:ICF KAISER ENGINEERING	WORK Order	:70159	
Ordered By	:RAY MORRIS	Report Completed	:09/29/93	
Project Name	:DEW LINE RI/FS BARROW	Collected	:08/26/93	@ 17:40 hrs.
Project#	:41096-412-01	Received	:08/28/93	@ 09:30 hrs.
PWSID	:UA	Technical Director	:STEPHEN C. EDE	
		Released By	:	

Sample Remarks: SAMPLE COLLECTED BY: D. NOE, JEFF J. DAWSON, AND S.S. SEPPOVEN.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Volatile Organics				EPA 8260				
Benzene	0.016		mg/L	EPA 8260		09/03	09/03	MCM
Bromobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Bromochloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Bromodichloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Bromoform	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Bromomethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
n-Butylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
sec-Butylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
tert-Butylbenzne	0.0010	U	mg/L	EPA 8260		09/03	09/03	[illegible]
Carbon Tetrachloride	0.0010	U	mg/L	EPA 8260		09/03	09/03	[illegible]
Chlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Chloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Chloroform	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Chloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
2-Chlorotoluene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
4-Chlorotoluene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Dibromochloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
12Dibromo3Chloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,2-Dibromoethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Dibromomethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,2-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,3-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,4-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Dichlorodifluoromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,1-Dichloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,2-Dichloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,1-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
cis-1,2-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
trans1,2-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,2-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,3-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
2,2-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,1-Dichloropropene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Ethylbenzene	0.0048		mg/L	EPA 8260		09/03	09/03	MCM
Hexachlorobutadiene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Isopropylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
p-Isopropyltoluene	0.0010	U	mg/L	EPA 8260		09/03	09/03	[illegible]

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

SMH 11-30-94

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4395-8
Client Sample ID :BRW-~~A0CZ~~-SW07 BARROW
Matrix :WATER SS03

Methylene Chloride	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
Napthalene	0.0042		mg/L	EPA 8260	09/03	09/03	MCM
n-Propylbenzene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
Styrene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1112-Tetrachloroethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1122-Tetrachloroethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
Tetrachloroethene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
Toluene	0.074		mg/L	EPA 8260	09/03	09/03	MCM
1,2,3-Trichlorobenzene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1,2,4-Trichlorobenzene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1,1,1-Trichloroethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1,1,2-Trichloroethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
Trichloroethene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
Trichlorofluoromethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1,2,3-Trichloropropane	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1,2,4-Trimethylbenzene	0.0089		mg/L	EPA 8260	09/03	09/03	MCM
1,3,5-Trimethylbenzene	0.0035		mg/L	EPA 8260	09/03	09/03	MCM
Vinyl Chloride	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
p+m-Xylene	0.050		mg/L	EPA 8260	09/03	09/03	MCM
o-Xylene	0.017		mg/L	EPA 8260	09/03	09/03	MCM

* See Special Instructions Above
See Sample Remarks Above
= Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.

ENVIRONMENTAL LABORATORY SERVICES

SINCE 1908

SMH 11-30-94

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL. (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4396-2
Client Sample ID :BRW-~~AOC2~~-SW07 BARROW
Matrix :WATER SS03

Client Name	:ICF KAISER ENGINEERING	WORK Order	:70161	
Ordered By	:RAY MORRIS	Report Completed	:09/28/93	
Project Name	:DEW LINE RI/FS BARROW	Collected	:08/26/93	@ 17:40 hrs.
Project#	:41096-412-01	Received	:08/28/93	@ 09:35 hrs
PWSID	:UA	Technical Director	:STEPHEN C. EDE	
		Released By	:	

Sample Remarks: SAMPLE COLLECTED BY: D. NOE.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Semivolatile Organics				EPA 8270				
Phenol	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
bis(2-Chloroethyl)ether	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
2-Chlorophenol	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
1,3-Dichlorobenzene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
1,4-Dichlorobenzene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Benzyl Alcohol	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
1,2-Dichlorobenzene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
2-Methylphenol	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
bis(2-Chloroisopropyl)e	0.011	U	mg/L	EPA 8270		09/01	09/04	[illegible]
4-Methylphenol	0.011	U	mg/L	EPA 8270		09/01	09/04	[illegible]
n-Nitroso-di-n-Propylam	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Hexachloroethane	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Nitrobenzene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Isophorone	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
2-Nitrophenol	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
2,4-Dimethylphenol	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Benzoic Acid	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
bis(2-Chloroethoxy)Meth	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
2,4-Dichlorophenol	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
1,2,4-Trichlorobenzene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Naphthalene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
4-Chloroaniline	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Hexachlorobutadiene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
4-Chloro-3-Methylphenol	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
2-Methylnaphthalene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Hexachlorocyclopentadie	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
2,4,6-Trichlorophenol	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
2,4,5-Trichlorophenol	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
2-Chloronaphthalene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
2-Nitroaniline	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Dimethylphthalate	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Acenaphthylene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
2,6-Dinitrotoluene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
3-Nitroaniline	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Acenaphthene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
2,4-Dinitrophenol	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
4-Nitrophenol	0.011	U	mg/L	EPA 8270		09/01	09/04	[illegible]

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL. (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4396-2
Client Sample ID :BRW-~~AOC2~~-SW07 BARROW SS03
Matrix :WATER

Dibenzofuran	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
2,4-Dinitrotoluene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Diethylphthalate	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
4-Chlorophenyl-Phenylet	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Fluorene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
4-Nitroaniline	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
4,6-Dinitro-2-Methylphe	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
n-Nitrosodiphenylamine	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
4-Bromophenyl-Phenyleth	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Hexachlorobenzene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Pentachlorophenol	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Phenanthrene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Anthracene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
di-n-Butylphthalate	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Fluoranthene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Pyrene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Butylbenzylphthalate	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
3,3-Dichlorobenzidine	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Benzo(a)Anthracene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Chrysene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
bis(2-Ethylhexyl)Phthal	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
di-n-Octylphthalate	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Benzo(b)Fluoranthene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Benzo(k)Fluoranthene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Benzo(a)Pyrene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Indeno(1,2,3-cd)Pyrene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Dibenz(a,h)Anthracene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Benzo(g,h,i)Perylene	0.011	U	mg/L	EPA 8270		09/01	09/04	MTT
Total Metals Analysis	---			-				
ICP Screen, ICF				EPA	n/a			
Aluminum	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Antimony	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Arsenic	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Barium	0.12		mg/L	EPA 6010		09/06	09/10	DLG
Beryllium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Cadmium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Calcium	41		mg/L	EPA 6010		09/06	09/10	DLG
Chromium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Cobalt	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Copper	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Iron	6.0		mg/L	EPA 6010		09/06	09/10	DLG
Lead	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Magnesium	42		mg/L	EPA 6010		09/06	09/10	DLG
Manganese	0.16		mg/L	EPA 6010		09/06	09/10	DLG
Molybdenum	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Nickel	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Potassium	7.3		mg/L	EPA 6010		09/06	09/10	DLG
Selenium	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Silver	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Sodium	130		mg/L	EPA 6010		09/06	09/10	DLG

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES
SINCE 1908

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 581-5301

SMT 11-30-94

REPORT of ANALYSIS

Chemlab Ref.# :93.4396-2
Client Sample ID :BRW-~~AOC2~~-SW07 BARROW
Matrix :WATER SS03

Thallium	0.005	U	mg/L	EPA 7841		09/06	09/08	BMW
Vanadium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Zinc	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Dissolved Metals Analys	---			-				
ICP Screen, ICF				EPA	n/a			
Aluminum	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Antimony	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Arsenic	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Barium	0.079		mg/L	EPA 6010		09/06	09/10	DLG
Beryllium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Cadmium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Calcium	38		mg/L	EPA 6010		09/06	09/10	DLG
Chromium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Cobalt	0.1	U	mg/L	EPA 6010		09/06	09/10	DLG
Copper	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Iron	0.17		mg/L	EPA 6010		09/06	09/10	DLG
Lead	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Magnesium	40		mg/L	EPA 6010		09/06	09/10	DLG
Manganese	0.098		mg/L	EPA 6010		09/06	09/10	DLG
Molybdenum	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Nickel	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Potassium	6.7		mg/L	EPA 6010		09/06	09/10	[illegible]G
Selenium	0.10	U	mg/L	EPA 6010		09/06	09/10	[illegible]G
Silver	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Sodium	120		mg/L	EPA 6010		09/06	09/10	DLG
Thallium	0.0050	U	mg/L	EPA 7841		09/06	09/08	BMW
Vanadium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Zinc	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
TOC, Nonpurgable				EPA 9060	n/a			
...TOC Range	31.4-35.8		mg/L	EPA 9060			09/08	CMR
...TOC Concentration	33.5		mg/L	EPA 9060			09/08	CMR
Residue, Non-Filterable	16		mg/L	EPA 160.2		09/02	09/02	GPP
Residue,Filterable(TDS)	895		mg/L	EPA 160.1	500		09/07	RJK

* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyze[illegible]
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4395-9
Client Sample ID :BRW-~~AOC2~~-SW08 BARROW
Matrix :WATER SS03

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70159
Report Completed :09/29/93
Collected :08/26/93 @ 17:00 hrs
Received :08/28/93 @ 09:30 hrs
Technical Director:STEPHEN C. EDE
Released By :

Sample Remarks: SAMPLE COLLECTED BY: D. NOE, JEFF J. DAWSON, AND S.S. SEPPOVEN.

Qualifier/Comments

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Volatile Organics				EPA 8260				
Benzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Bromobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Bromochloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Bromodichloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Bromoform	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Bromomethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
n-Butylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
sec-Butylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
tert-Butylbenzne	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Carbon Tetrachloride	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Chlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Chloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Chloroform	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Chloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
2-Chlorotoluene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
4-Chlorotoluene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Dibromochloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
12Dibromo3Chloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,2-Dibromoethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Dibromomethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,2-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,3-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,4-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Dichlorodifluoromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,1-Dichloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,2-Dichloroethane	0.0016		mg/L	EPA 8260	(J) -J. 1	09/03	09/03	MCM
1,1-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
cis-1,2-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
trans1,2-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,2-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,3-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
2,2-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,1-Dichloropropene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Ethylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Hexachlorobutadiene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Isopropylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
p-Isopropyltoluene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM

2-22-94

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

SMC 3044

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 9951
TEL: (907) 562-234
FAX: (907) 561-530

Chemlab Ref.# :93.4395-9
Client Sample ID :BRW-~~AOC2~~-SW08 BARROW
Matrix :WATER SS03

Qualifiers/Comments

Methylene Chloride	0.0010	U	mg/L	EPA 8260		09/03 09/03	M
Napthalene	0.0010	U	mg/L	EPA 8260	(J)-J.1	09/03 09/03	M
n-Propylbenzene	0.0010	U	mg/L	EPA 8260		09/03 09/03	M
Styrene	0.0010	U	mg/L	EPA 8260		09/03 09/03	M
1112-Tetrachloroethane	0.0010	U	mg/L	EPA 8260		09/03 09/03	M
1122-Tetrachloroethane	0.0010	U	mg/L	EPA 8260		09/03 09/03	M
Tetrachloroethene	0.0010	U	mg/L	EPA 8260		09/03 09/03	M
Toluene	0.0010	U	mg/L	EPA 8260		09/03 09/03	M
1,2,3-Trichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03 09/03	M
1,2,4-Trichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03 09/03	M
1,1,1-Trichloroethane	0.0010	U	mg/L	EPA 8260		09/03 09/03	M
1,1,2-Trichloroethane	0.0010	U	mg/L	EPA 8260		09/03 09/03	M
Trichloroethene	0.0010	U	mg/L	EPA 8260		09/03 09/03	M
Trichlorofluoromethane	0.0010	U	mg/L	EPA 8260		09/03 09/03	M
1,2,3-Trichloropropane	0.0010	U	mg/L	EPA 8260		09/03 09/03	M
1,2,4-Trimethylbenzene	0.0024		mg/L	EPA 8260		09/03 09/03	M
1,3,5-Trimethylbenzene	0.0030		mg/L	EPA 8260		09/03 09/03	M
Vinyl Chloride	0.0010	U	mg/L	EPA 8260		09/03 09/03	M
p+m-Xylene	0.0027		mg/L	EPA 8260		09/03 09/03	M
o-Xylene	0.0036		mg/L	EPA 8260		09/03 09/03	M

2-22-94

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* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL (907) 562-2343
FAX (907) 561-5301

Chemlab Ref.# :93.4396-3
Client Sample ID :BRW-~~AOC2~~-SW08 BARROW
Matrix :WATER SS03

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70161
Report Completed :09/28/93
Collected :08/26/93 @ 17:00 hrs
Received :08/28/93 @ 09:35 hrs
Technical Director:STEPHEN C. EDE
Released By : C. Homestead

Sample Remarks: SAMPLE COLLECTED BY: D. NOE.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Semivolatile Organics				EPA 8270				
Phenol	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
bis(2-Chloroethyl)ether	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
2-Chlorophenol	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
1,3-Dichlorobenzene	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
1,4-Dichlorobenzene	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
Benzyl Alcohol	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
1,2-Dichlorobenzene	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
2-Methylphenol	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
bis(2-Chloroisopropyl)e	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
4-Methylphenol	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
n-Nitroso-di-n-Propylam	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
Hexachloroethane	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
Nitrobenzene	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
Isophorone	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
2-Nitrophenol	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
2,4-Dimethylphenol	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
Benzoic Acid	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
bis(2-Chloroethoxy)Meth	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
2,4-Dichlorophenol	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
1,2,4-Trichlorobenzene	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
Naphthalene	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
4-Chloroaniline	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
Hexachlorobutadiene	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
4-Chloro-3-Methylphenol	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
2-Methylnaphthalene	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
Hexachlorocyclopentadie	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
2,4,6-Trichlorophenol	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
2,4,5-Trichlorophenol	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
2-Chloronaphthalene	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
2-Nitroaniline	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
Dimethylphthalate	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
Acenaphthylene	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
2,6-Dinitrotoluene	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
3-Nitroaniline	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
Acenaphthene	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
2,4-Dinitrophenol	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
4-Nitrophenol	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES
SINCE 1908

5633 B STREET
ANCHORAGE, AK 99518
TEL. (907) 562-2343
FAX: (907) 561-5301

REPORT of ANALYSIS

Chemlab Ref.# :93.4396-3
Client Sample ID :BRW-~~AOC2~~-SW08 BARROW
Matrix :WATER SS03

Dibenzofuran	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
2,4-Dinitrotoluene	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
Diethylphthalate	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
4-Chlorophenyl-Phenylet	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
Fluorene	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
4-Nitroaniline	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
4,6-Dinitro-2-Methylphe	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
n-Nitrosodiphenylamine	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
4-Bromophenyl-Phenyleth	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
Hexachlorobenzene	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
Pentachlorophenol	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
Phenanthrene	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
Anthracene	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
di-n-Butylphthalate	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
Fluoranthene	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
Pyrene	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
Butylbenzylphthalate	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
3,3-Dichlorobenzidine	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
Benzo(a)Anthracene	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
Chrysene	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
bis(2-Ethylhexyl)Phthal	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
di-n-Octylphthalate	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
Benzo(b)Fluoranthene	0.011	U	mg/L	EPA 8270		09/02	09/25	[illegible]
Benzo(k)Fluoranthene	0.011	U	mg/L	EPA 8270		09/02	09/25	[illegible]T
Benzo(a)Pyrene	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
Indeno(1,2,3-cd)Pyrene	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
Dibenz(a,h)Anthracene	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
Benzo(g,h,i)Perylene	0.011	U	mg/L	EPA 8270		09/02	09/25	MTT
Total Metals Analysis	---			-				
ICP Screen, ICF				EPA	n/a			
Aluminum	0.1	U	mg/L	EPA 6010		09/15	09/20	DFL
Antimony	0.1	U	mg/L	EPA 6010		09/15	09/20	DFL
Arsenic	0.1	U	mg/L	EPA 6010		09/15	09/20	DFL
Barium	0.05	U	mg/L	EPA 6010		09/15	09/20	DFL
Beryllium	0.05	U	mg/L	EPA 6010		09/15	09/20	DFL
Cadmium	0.05	U	mg/L	EPA 6010		09/15	09/20	DFL
Calcium	35		mg/L	EPA 6010		09/15	09/20	DFL
Chromium	0.05	U	mg/L	EPA 6010		09/15	09/20	DFL
Cobalt	0.1	U	mg/L	EPA 6010		09/15	09/20	DFL
Copper	0.05	U	mg/L	EPA 6010		09/15	09/20	DFL
Iron	2.8		mg/L	EPA 6010		09/15	09/20	DFL
Lead	0.1	U	mg/L	EPA 6010		09/15	09/20	DFL
Magnesium	35		mg/L	EPA 6010		09/15	09/20	DFL
Manganese	0.14		mg/L	EPA 6010		09/15	09/20	DFL
Molybdenum	0.05	U	mg/L	EPA 6010		09/15	09/20	DFL
Nickel	0.05	U	mg/L	EPA 6010		09/15	09/20	DFL
Potassium	10		mg/L	EPA 6010		09/15	09/17	DFL
Selenium	0.1	U	mg/L	EPA 6010		09/15	09/20	DFL
Silver	0.05	U	mg/L	EPA 6010		09/15	09/20	DFL
Sodium	160		mg/L	EPA 6010		09/15	09/17	DFL

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

Gut 11.30.94

REPORT of ANALYSIS

Chemlab Ref.# :93.4396-3
Client Sample ID :BRW-~~A0C2~~-SW08 BARROW
Matrix :WATER SS03

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Thallium	0.0050	U	mg/L	EPA 7841		09/15	09/17	KAW
Vanadium	0.05	U	mg/L	EPA 6010		09/15	09/20	DFL
Zinc	0.050	U	mg/L	EPA 6010		09/15	09/20	DFL
Dissolved Metals Analys	---							
ICP Screen, ICF				-				
Aluminum				EPA	n/a			
Antimony	0.1	U	mg/L	EPA 6010		09/15	09/20	DFL
Arsenic	0.1	U	mg/L	EPA 6010		09/15	09/20	DFL
Barium	0.1	U	mg/L	EPA 6010		09/15	09/20	DFL
Beryllium	0.05	U	mg/L	EPA 6010		09/15	09/20	DFL
Cadmium	0.05	U	mg/L	EPA 6010		09/15	09/20	DFL
Calcium	0.05	U	mg/L	EPA 6010		09/15	09/20	DFL
Chromium	36		mg/L	EPA 6010		09/15	09/20	DFL
Cobalt	0.05	U	mg/L	EPA 6010		09/15	09/20	DFL
Copper	0.1	U	mg/L	EPA 6010		09/15	09/20	DFL
Iron	0.05	U	mg/L	EPA 6010		09/15	09/20	DFL
Lead	0.36		mg/L	EPA 6010		09/15	09/20	DFL
Magnesium	0.1	U	mg/L	EPA 6010		09/15	09/20	DFL
Manganese	34		mg/L	EPA 6010		09/15	09/20	DFL
Molybdenum	0.13		mg/L	EPA 6010		09/15	09/20	DFL
Nickel	0.05	U	mg/L	EPA 6010		09/15	09/20	DFL
Potassium	0.05	U	mg/L	EPA 6010		09/15	09/20	DFL
Selenium	11		mg/L	EPA 6010		09/15	09/17	DFL
Silver	0.1	U	mg/L	EPA 6010		09/15	09/20	DFL
Sodium	0.05	U	mg/L	EPA 6010		09/15	09/20	DFL
Thallium	160		mg/L	EPA 6010		09/15	09/17	DFL
Vanadium	0.0050	U	mg/L	EPA 7841		09/15	09/17	KAW
Zinc	0.05	U	mg/L	EPA 6010		09/15	09/20	DFL
	0.050	U	mg/L	EPA 6010		09/15	09/20	DFL
TOC, Nonpurgable				EPA 9060	n/a			
...TOC Range	15.7-18.0		mg/L	EPA 9060			09/08	CMR
...TOC Concentration	17.2		mg/L	EPA 9060			09/08	CMR

* See Special Instructions Above
See Sample Remarks Above
= Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.

ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4394-4
Client Sample ID :BRW-~~AOC2~~-SW08 BARROW
Matrix :WATER SS03

Client Name	:ICF KAISER ENGINEERING	WORK Order	:70157
Ordered By	:RAY MORRIS	Report Completed	:09/28/93
Project Name	:DEW LINE RI/FS	Collected	:08/26/93 @ 17:00 hrs
Project#	:41096-412-01	Received	:08/28/93 @ 09:35 hrs
PWSID	:UA	Technical Director	:STEPHEN C. EDE
		Released By	:

Sample Remarks: SAMPLE COLLECTED BY: D. NOE AND S.S. SEPPOVEN.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Residue, Non-Filterable	12		mg/L	EPA 160.2		09/02	09/02	GPP
Residue,Filterable(TDS)	677		mg/L	EPA 160.1	500		09/07	RJK

* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

SGS Member of the SGS Group (Société Générale de Surveillance)

Compiled by SAP 9-15-9

ICF ID	BRW-SS03-S01	BRW-SS03-S02	BRW-SS03-S03
F&BI Number	1122	1124	1126
Sample Type	soil	soil	soil
Date Received	8/27/93	8/27/93	8/27/93
% Dry Weight	86	91	90
Sequence Date	#5-08/31/93	#5-08/31/93	#5-08/31/93
Leaded Gas			
JP-4	<60	<50	<50
Lube Oil	<120	<110	<110
Diesel	<60	<50	<50
Spike Level			
Unknown Semi-vola			
Pentacosane	75	70	67
Sequence Date			
PCB 1221			
PCB 1232			
PCB 1016			
PCB 1242			
PCB 1248			
PCB 1254			
PCB 1260			
Spike Level			
Dibutyl Chlorendate			
Sequence Date			
alpha-BHC			
beta-BHC			
gamma-BHC			
delta-BHC			
Heptachlor			
Aldrin			
Heptachlor Epoxide			
Endosulfan I			
DDE			
Dieldrin			
Endrin			
Endosulfan II			
DDD			
Endrin Aldehyde			
DDT			
Endosulfan Sulfate			
Endrin Ketone			
Methoxy Chlor			
Chlordane			
Dibutyl Chlorendate			
Spike Level			
Vol Sequence	#1&2-09/02/93	#1&2-09/02/93	#1&2-09/02/93
CCl4	<0.02	<0.02	~~0.13~~ <.02
TCA	<0.02	<0.02	~~0.4~~ <.02
Benzene	0.35 J	<0.02	<0.02
TCE	<0.02	<0.02	<0.02
Toluene	5.3	<0.02	<0.02
PCE	<0.02	<0.02	<0.02
Ethylbenzene	0.26	<0.02	<0.02
Xylenes	1.6 J	<0.04	<0.04
Gasoline	~~<1~~ 11J	<1 J	<1 J
Spike level			
BFB	109	91	96

Compiled by sgm 9-15-9

ICF ID	BRW-SS03-S04	BRW-SS03-S05	BRW-SS03-S06
F&BI Number	1128	1130	1132
Sample Type	soil	soil	soil
Date Received	8/27/93	8/27/93	8/27/93
% Dry Weight	98	97	98
Sequence Date	#5-08/31/93	#5-08/31/93	#5-08/31/93
Leaded Gas			
JP-4	<50	<50	<50
Lube Oil	<100	<100	<100
Diesel	<50	<50	<50
Spike Level			
Unknown Semi-vola			
Pentacosane	66	55	59
Sequence Date			
PCB 1221			
PCB 1232			
PCB 1016			
PCB 1242			
PCB 1248			
PCB 1254			
PCB 1260			
Spike Level			
Dibutyl Chlorendate			
Sequence Date			
alpha-BHC			
beta-BHC			
gamma-BHC			
delta-BHC			
Heptachlor			
Aldrin			
Heptachlor Epoxide			
Endosulfan I			
DDE			
Dieldrin			
Endrin			
Endosulfan II			
DDD			
Endrin Aldehyde			
DDT			
Endosulfan Sulfate			
Endrin Ketone			
Methoxy Chlor			
Chlordane			
Dibutyl Chlorendate			
Spike Level			
Vol Sequence	#1&2-09/02/93	#1&2-09/02/93	#1&2-09/02/93
CCl4	<0.02	<0.02	<0.02
TCA	~~0.3~~ <.02	<0.02	<0.02
Benzene	<0.02	<0.02	<0.02
TCE	<0.02	<0.02	<0.02
Toluene	<0.02	<0.02	<0.02
PCE	<0.02	<0.02	<0.02
Ethylbenzene	~~0.03~~ <.02	<0.02	<0.02
Xylenes	~~0.1~~ <.04	~~0.18~~ 0.28	<0.04
Gasoline	<1 J	<1 J	<1 J
Spike level			
BFB	94	109	70

ICF ID	BRW-SS03-S06	BRW-SS03-S06	BRW-SS03-S06
F&BI Number	1132 dup	1132 ms	1132 msd
Sample Type	soil	soil	soil
Date Received	8/27/93	8/27/93	8/27/93
% Dry Weight			
Sequence Date	#5-08/31/93	#5-08/31/93	#5-08/31/93
Leaded Gas			
JP-4	<50		
Lube Oil	<100		
Diesel	<50	98	92
Spike Level		500	500
Unknown Semi-vola			
Pentacosane	92	105	136
Sequence Date			
PCB 1221			
PCB 1232			
PCB 1016			
PCB 1242			
PCB 1248			
PCB 1254			
PCB 1260			
Spike Level			
Dibutyl Chlorendate			
Sequence Date			
alpha-BHC			
beta-BHC			
gamma-BHC			
delta-BHC			
Heptachlor			
Aldrin			
Heptachlor Epoxide			
Endosulfan I			
DDE			
Dieldrin			
Endrin			
Endosulfan II			
DDD			
Endrin Aldehyde			
DDT			
Endosulfan Sulfate			
Endrin Ketone			
Methoxy Chlor			
Chlordane			
Dibutyl Chlorendate			
Spike Level			
Vol Sequence			
CCl4			
TCA			
Benzene			
TCE			
Toluene			
PCE			
Ethylbenzene			
Xylenes			
Gasoline			
Spike level			
BFB			

compiled by SAM 9-15-95

ICF ID	BRW-SS03-S07	BRW-SS03-SD01	BRW-SS03-SD02
F&BI Number	1134	828	830
Sample Type	soil	soil	soil
Date Received	8/27/93	8/27/93	8/27/93
% Dry Weight	98	96	65
Sequence Date	#5-08/31/93	#6-08/28/93	#6-08/28/93
Leaded Gas			
JP-4	<50	<50	700
Lube Oil	<100	<100	<150
Diesel	<50	270 J	500 J
Spike Level			
Unknown Semi-vola			
Pentacosane	79	107	118
Sequence Date		#6-08/28/93	#6-08/28/93
PCB 1221		<0.1	<0.1
PCB 1232		<0.1	<0.1
PCB 1016		<0.1	<0.1
PCB 1242		<0.1	<0.1
PCB 1248		<0.1	<0.1
PCB 1254		<0.1	<0.1
PCB 1260		<0.1	<0.1
Spike Level			
Dibutyl Chlorendate		107	78
Sequence Date			
alpha-BHC			
beta-BHC			
gamma-BHC			
delta-BHC			
Heptachlor			
Aldrin			
Heptachlor Epoxide			
Endosulfan I			
DDE			
Dieldrin			
Endrin			
Endosulfan II			
DDD			
Endrin Aldehyde			
DDT			
Endosulfan Sulfate			
Endrin Ketone			
Methoxy Chlor			
Chlordane			
Dibutyl Chlorendate			
Spike Level			
Vol Sequence	#1&2-09/02/93	#3-08/28/93, #4-08/29/93	#3-08/28/93, #4-08/29/93
CCl4	<0.02	<0.02	<0.03
TCA	~~0.2~~ <0.02	<0.02	<0.03
Benzene	<0.02	<0.02	<0.03
TCE	<0.02	<0.02	<0.03
Toluene	<0.02	~~0.15~~ 0.046 J	<0.03
PCE	<0.02	<0.02	<0.03
Ethylbenzene	<0.02	<0.02	~~0.8~~ 1.4 J
Xylenes	<0.04	<0.19	~~1.9~~ 2.6 J
Gasoline	<1 J	<2 J	1200 J
Spike level			
BFB	106	106	117

Compiled by sgm 9-15-95

ICF ID	BRW-SS03-SD03	BRW-SS03-SD04	BRW-SS03-SD05
F&BI Number	832	834	836
Sample Type	soil	soil	soil
Date Received	8/27/93	8/27/93	8/27/93
% Dry Weight	46	68	71
Sequence Date	#6-08/28/93	#6-08/28/93	#6-08/28/93
Leaded Gas			
JP-4	1500	<70	15000
Lube Oil	<220	<150	<140
Diesel	450 J	<70 J	11000 J
Spike Level			
Unknown Semi-vola	20 biogenic		130 biogenic
Pentacosane	98	97	100
Sequence Date	#6-08/28/93	#6-08/28/93	#6-08/28/93
PCB 1221	<~~0.1~~ <0.2 J	<0.1	<0.1
PCB 1232	<~~0.1~~	<0.1	<0.1
PCB 1016	<~~0.1~~	<0.1	<0.1
PCB 1242	<~~0.1~~	<0.1	<0.1
PCB 1248	<~~0.1~~	<0.1	<0.1
PCB 1254	<~~0.1~~	<0.1	<0.1
PCB 1260	<~~0.1~~	<0.1	<0.1
Spike Level			
Dibutyl Chlorendate	94	98	100
Sequence Date	#6-08/28/93	#6-08/28/93	
alpha-BHC	<0.01	<0.01	
beta-BHC	<0.01	<0.01	
gamma-BHC	<0.01	<0.01	
delta-BHC	<0.01	<0.01	
Heptachlor	<0.01	<0.01	
Aldrin	<0.01	<0.01	
Heptachlor Epoxide	<0.01	<0.01	
Endosulfan I	<0.01	<0.01	
DDE	<0.01	<0.01	
Dieldrin	<0.01	<0.01	
Endrin	<0.01	<0.01	
Endosulfan II	<0.01	<0.01	
DDD	<0.01	<0.01	
Endrin Aldehyde	<0.01	<0.01	
DDT	<0.01	<0.01	
Endosulfan Sulfate	<0.01	<0.01	
Endrin Ketone	<0.01	<0.01	
Methoxy Chlor	<0.1	<0.1	
Chlordane	<0.5	<0.5	
Dibutyl Chlorendate	94	98	
Spike Level			
Vol Sequence		#3-08/28/93, #4-08/29/93	#3-08/28/93, #4-08/29/93
CCl4		<0.03	<0.03
TCA		<0.03	<0.03
Benzene		<0.03	<0.03
TCE		<0.03	<0.03
Toluene		<0.03	<0.03
PCE		<0.03	<0.03
Ethylbenzene		<0.03	0.5 J
Xylenes		<0.06	~~2.2~~ 3.3 J
Gasoline		<3 J	~~57~~ 114 J
Spike level			
BFB		104	94

Compiled by SAM 9-15-95

ICF ID	BRW-SS03-SD06	BRW-SS03-SD07	BRW-SS03-SD08
F&BI Number	838	840	842
Sample Type	soil	soil	soil
Date Received	8/27/93	8/27/93	8/27/93
% Dry Weight	83	82	83
Sequence Date	#6-08/28/93	#6-08/28/93	#6-08/28/93
Leaded Gas			
JP-4	<60	700	240
Lube Oil	<120	<120	120
Diesel	~~60~~ <60 J	300 J	110 J
Spike Level			
Unknown Semi-vola			
Pentacosane	103	93	104
Sequence Date	#6-08/28/93	#6-08/28/93	#6-08/28/93
PCB 1221	<0.1	<0.1	<0.1
PCB 1232	<0.1	<0.1	<0.1
PCB 1016	<0.1	<0.1	<0.1
PCB 1242	<0.1	<0.1	<0.1
PCB 1248	<0.1	<0.1	<0.1
PCB 1254	<0.1	<0.1	<0.1
PCB 1260	<0.1	<0.1	<0.1
Spike Level			
Dibutyl Chlorendate	98	93	104
Sequence Date	#6-08/28/93	#6-08/28/93	#6-08/28/93
alpha-BHC	<0.01	<0.01 J	<0.01 J
beta-BHC	<0.01	<0.01	<0.01
gamma-BHC	<0.01	<0.01	<0.01
delta-BHC	<0.01	<0.01	<0.01
Heptachlor	<0.01	<0.01	<0.01
Aldrin	<0.01	<0.01	<0.01
Heptachlor Epoxide	<0.01	<0.01	<0.01
Endosulfan I	<0.01	<0.01	<0.01
DDE	<0.01	<0.01	<0.01
Dieldrin	<0.01	<0.01	<0.01
Endrin	<0.01	<0.01	<0.01
Endosulfan II	<0.01	<0.01	<0.01
DDD	<0.01	<0.01	<0.01
Endrin Aldehyde	<0.01	<0.01	<0.01
DDT	<0.01	<0.01	<0.01
Endosulfan Sulfate	<0.01	<0.01	<0.01
Endrin Ketone	<0.01	<0.01	<0.01
Methoxy Chlor	<0.1	<0.1 R	<0.1 R
Chlordane	<0.5	<0.5 J	<0.5 J
Dibutyl Chlorendate	98	94	104
Spike Level			
Vol Sequence	#3-08/28/93, #4-08/29/93	#3-08/28/93, #4-08/29/93	#3-08/28/93, #4-08/29/93
CCl4	<0.02	<0.02	<0.02
TCA	<0.02	<0.02	<0.02
Benzene	<0.02	<0.02	<0.02
TCE	<0.02	<0.02	<0.02
Toluene	<0.02	<0.02	<0.02
PCE	<0.02	<0.02	<0.02
Ethylbenzene	<0.02	1 J	~~5.2~~ 1.2 J
Xylenes	<0.04	~~5~~ 6.5 J	~~5.4~~ 7.1 J
Gasoline	<2 J	~~280~~ 790 J	~~340~~ 960 J
Spike level			
BFB	86	106	100

compiled by sgm 9-15-95

ICF ID	BRW-SS03-SW01	BRW-SS03-SW01	BRW-SS03-SW02
F&BI Number	794	843	798
Sample Type	water	water	water
Date Received	8/27/93	8/27/93	8/27/93
% Dry Weight			
Sequence Date		8/31/1993 !!	
Leaded Gas			
JP-4		<200	
Lube Oil		<2000	
Diesel		~~<200~~ <2500	
Spike Level			
Unknown Semi-vola			
Pentacosane		58	
Sequence Date		#5-08/28/93	
PCB 1221		~~<2~~ <5	
PCB 1232		~~<2~~	
PCB 1016		~~<2~~	
PCB 1242		~~<2~~	
PCB 1248		~~<2~~	
PCB 1254		~~<2~~	
PCB 1260		~~<2~~	
Spike Level			
Dibutyl Chlorendate		60	
Sequence Date			
alpha-BHC			
beta-BHC			
gamma-BHC			
delta-BHC			
Heptachlor			
Aldrin			
Heptachlor Epoxide			
Endosulfan I			
DDE			
Dieldrin			
Endrin			
Endosulfan II			
DDD			
Endrin Aldehyde			
DDT			
Endosulfan Sulfate			
Endrin Ketone			
Methoxy Chlor			
Chlordane			
Dibutyl Chlorendate			
Spike Level			
Vol Sequence	#1&2-08/25/93		#1&2-08/25/93
CCl4	<1		<1
TCA	<1		<1
Benzene	<1		<1
TCE	<1		<1
Toluene	<1		<1
PCE	<1		<1
Ethylbenzene	<1		<1
Xylenes	<2		11
Gasoline	<50 J		200 J
Spike level			
BFB	127		110

Compiled by SAM 9-15-9

ICF ID	BRW-SS03-SW02	BRW-SS03-SW03	BRW-SS03-SW03
F&BI Number	844	800	845
Sample Type	water	water	water
Date Received	8/27/93	8/27/93	8/27/93
% Dry Weight			
Sequence Date	#5-08/28/93		#5-08/28/93
Leaded Gas			
JP-4	<200		<200
Lube Oil	<2000		<2000
Diesel	~~<200~~ <2500		~~<200~~ <2500
Spike Level			
Unknown Semi-vola			
Pentacosane	70		92
Sequence Date	#5-08/28/93		#5-08/28/93
PCB 1221	~~<2~~ <5		~~<2~~ <5
PCB 1232	~~<2~~		~~<2~~
PCB 1016	~~<2~~		~~<2~~
PCB 1242	~~<2~~		~~<2~~
PCB 1248	~~<2~~		~~<2~~
PCB 1254	~~<2~~		~~<2~~
PCB 1260	~~<2~~		~~<2~~
Spike Level			
Dibutyl Chlorendate	68		92
Sequence Date			
alpha-BHC			
beta-BHC			
gamma-BHC			
delta-BHC			
Heptachlor			
Aldrin			
Heptachlor Epoxide			
Endosulfan I			
DDE			
Dieldrin			
Endrin			
Endosulfan II			
DDD			
Endrin Aldehyde			
DDT			
Endosulfan Sulfate			
Endrin Ketone			
Methoxy Chlor			
Chlordane			
Dibutyl Chlorendate			
Spike Level			
Vol Sequence		#1&2-08/25/93	
CCl4		<1	
TCA		<1	
Benzene		<1	
TCE		<1	
Toluene		10	
PCE		<1	
Ethylbenzene		5	
Xylenes		11	
Gasoline		~~200~~ 136 J	
Spike level			
BFB		117	

compiled by 59A 9-15-95

ICF ID	BRW-SS03-SW04	BRW-SS03-SW04	BRW-SS03-SW05
F&BI Number	804	846	806
Sample Type	water	water	water
Date Received	8/27/93	8/27/93	8/27/93
% Dry Weight			
Sequence Date		#5-08/28/93	
Leaded Gas			
JP-4		<200	
Lube Oil		<2000	
Diesel		~~<200~~ < 2500	
Spike Level			
Unknown Semi-vola			
Pentacosane		74	
Sequence Date		#5-08/28/93	
PCB 1221		~~<2~~ < 5	
PCB 1232		~~<2~~	
PCB 1016		~~<2~~	
PCB 1242		~~<2~~	
PCB 1248		~~<2~~	
PCB 1254		~~<2~~	
PCB 1260		~~<2~~	
Spike Level			
Dibutyl Chlorendate		74	
Sequence Date			
alpha-BHC			
beta-BHC			
gamma-BHC			
delta-BHC			
Heptachlor			
Aldrin			
Heptachlor Epoxide			
Endosulfan I			
DDE			
Dieldrin			
Endrin			
Endosulfan II			
DDD			
Endrin Aldehyde			
DDT			
Endosulfan Sulfate			
Endrin Ketone			
Methoxy Chlor			
Chlordane			
Dibutyl Chlorendate			
Spike Level			
Vol Sequence	#1&2-08/25/93		#1&2-08/25/93
CCl4	<1		<1
TCA	<1		<1
Benzene	<1		83
TCE	<1		<1
Toluene	<1		<1
PCE	<1		<1
Ethylbenzene	<1		21
Xylenes	<2		280
Gasoline	<50 J		~~1600~~ 1126 J
Spike level			
BFB	109		100

Compiled [illegible] by 9-15-[illegible]

ICF ID	BRW-SS03-SW05	BRW-SS03-SW06	BRW-SS03-SW06
F&BI Number	847	810	848
Sample Type	water	water	water
Date Received	8/27/93	8/27/93	8/27/93
% Dry Weight			
Sequence Date	#5-08/28/93		#5-08/28/93
Leaded Gas			
JP-4	<200		<200
Lube Oil	<2000		<2000
Diesel	~~<200~~ <2500		~~<200~~ <2500
Spike Level			
Unknown Semi-vola			
Pentacosane	69		86
Sequence Date	#5-08/28/93		#5-08/28/93
PCB 1221	~~<2~~ <5		~~<2~~ <5
PCB 1232	~~<2~~		~~<2~~
PCB 1016	~~<2~~		~~<2~~
PCB 1242	~~<2~~		~~<2~~
PCB 1248	~~<2~~		~~<2~~
PCB 1254	~~<2~~		~~<2~~
PCB 1260	~~<2~~		~~<2~~
Spike Level			
Dibutyl Chlorendate	69		86
Sequence Date			
alpha-BHC			
beta-BHC			
gamma-BHC			
delta-BHC			
Heptachlor			
Aldrin			
Heptachlor Epoxide			
Endosulfan I			
DDE			
Dieldrin			
Endrin			
Endosulfan II			
DDD			
Endrin Aldehyde			
DDT			
Endosulfan Sulfate			
Endrin Ketone			
Methoxy Chlor			
Chlordane			
Dibutyl Chlorendate			
Spike Level			
Vol Sequence		#1&2-08/25/93	*
CCl4		<1	
TCA		<1	
Benzene		<1	
TCE		<1	
Toluene		<1	
PCE		<1	
Ethylbenzene		<1	
Xylenes		<2	
Gasoline		<50 J	
Spike level			
BFB		103	

compiled SAM by 9-15-

ICF ID	BRW-SS03-SW07	BRW-SS03-SW07	BRW-SS03-SW08
F&BI Number	812	849	814
Sample Type	water	water	water
Date Received	8/27/93	8/27/93	8/27/93
% Dry Weight			
Sequence Date		#5-08/28/93	
Leaded Gas			
JP-4		<200	
Lube Oil		<2000	
Diesel		~~<200~~ <2500	
Spike Level			
Unknown Semi-vola			
Pentacosane		80	
Sequence Date		#5-08/28/93	
PCB 1221		~~<2~~ <5	
PCB 1232		~~<2~~	
PCB 1016		~~<2~~	
PCB 1242		~~<2~~	
PCB 1248		~~<2~~	
PCB 1254		~~<2~~	
PCB 1260		~~<2~~	
Spike Level			
Dibutyl Chlorendate		79	
Sequence Date			
alpha-BHC			
beta-BHC			
gamma-BHC			
delta-BHC			
Heptachlor			
Aldrin			
Heptachlor Epoxide			
Endosulfan I			
DDE			
Dieldrin			
Endrin			
Endosulfan II			
DDD			
Endrin Aldehyde			
DDT			
Endosulfan Sulfate			
Endrin Ketone			
Methoxy Chlor			
Chlordane			
Dibutyl Chlorendate			
Spike Level			
Vol Sequence	#1&2-08/25/93 or #3&4-08/9/93 !!		#1&2-08/25/93
CCl4	<1 R		<1
TCA	<1		<1
Benzene	22		<1
TCE	<1		<1
Toluene	110		<1
PCE	<1		<1
Ethylbenzene	86		<1
Xylenes	120		<2
Gasoline	2000		<50 J
Spike level			
BFB	138		103

compiled by SAP 9-15-94

ICF ID	BRW-SS03-SW08
F&BI Number	850
Sample Type	water
Date Received	8/27/93
% Dry Weight	
Sequence Date	#5-08/28/93
Leaded Gas	
JP-4	<200
Lube Oil	<2000
Diesel	~~<200~~ <2500
Spike Level	
Unknown Semi-vola	
Pentacosane	76
Sequence Date	#5-08/28/93
PCB 1221	~~<2~~ <5
PCB 1232	~~<2~~
PCB 1016	~~<2~~
PCB 1242	~~<2~~
PCB 1248	~~<2~~
PCB 1254	~~<2~~
PCB 1260	~~<2~~
Spike Level	
Dibutyl Chlorendate	76
Sequence Date	
alpha-BHC	
beta-BHC	
gamma-BHC	
delta-BHC	
Heptachlor	
Aldrin	
Heptachlor Epoxide	
Endosulfan I	
DDE	
Dieldrin	
Endrin	
Endosulfan II	
DDD	
Endrin Aldehyde	
DDT	
Endosulfan Sulfate	
Endrin Ketone	
Methoxy Chlor	
Chlordane	
Dibutyl Chlorendate	
Spike Level	
Vol Sequence	
CCl4	
TCA	
Benzene	
TCE	
Toluene	
PCE	
Ethylbenzene	
Xylenes	
Gasoline	
Spike level	
BFB	

ANALYTICAL DATA SHEETS FOR BACKGROUND (BKGD)

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

CE 1908

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

REPORT of ANALYSIS

Chemlab Ref.# :93.4397-4
Client Sample ID :BRW-BKGD-S01 BARROW
Matrix :SOIL

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70163
Report Completed :10/15/93
Collected :08/26/93 @ 14:20 hrs.
Received :08/28/93 @ 09:35 hrs.
Technical Director:STEPHEN C. EDE
Released By : C. Homestead

Sample Remarks: SAMPLE COLLECTED BY: S.S. SEPPOVEN. HIGH DETECTION LIMIT ON 8270 DUE TO THE FACT THAT THE EXTRACT WAS BLACK AFTER CONCENTRATION. 8260 SAMPLE WAS OVER HOLD TIME AND NOT ANALYZED AS PER CLIENT.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Semivolatile Organics				EPA 8270				
Phenol	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
bis(2-Chloroethyl)ether	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
2-Chlorophenol	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
1,3-Dichlorobenzene	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
1,4-Dichlorobenzene	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
Benzyl Alcohol	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
2-Dichlorobenzene	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
-Methylphenol	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
bis(2-Chloroisopropyl)e	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
4-Methylphenol	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
n-Nitroso-di-n-Propylam	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
Hexachloroethane	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
Nitrobenzene	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
Isophorone	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
2-Nitrophenol	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
2,4-Dimethylphenol	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
Benzoic Acid	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
bis(2-Chloroethoxy)Meth	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
2,4-Dichlorophenol	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
1,2,4-Trichlorobenzene	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
Naphthalene	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
4-Chloroaniline	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
Hexachlorobutadiene	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
4-Chloro-3-Methylphenol	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
2-Methylnaphthalene	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
Hexachlorocyclopentadie	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
2,4,6-Trichlorophenol	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
2,4,5-Trichlorophenol	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
2-Chloronaphthalene	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
2-Nitroaniline	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
Dimethylphthalate	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
Acenaphthylene	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
2,6-Dinitrotoluene	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
3-Nitroaniline	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
enaphthene	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES
SINCE 1908

5633 B ST
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

REPORT of ANALYSIS

Chemlab Ref.# :93.4397-4
Client Sample ID :BRW-BKGD-S01 BARROW
Matrix :SOIL

2,4-Dinitrophenol	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
4-Nitrophenol	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
Dibenzofuran	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
2,4-Dinitrotoluene	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
Diethylphthalate	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
4-Chlorophenyl-Phenylet	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
Fluorene	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
4-Nitroaniline	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
4,6-Dinitro-2-Methylphe	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
n-Nitrosodiphenylamine	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
4-Bromophenyl-Phenyleth	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
Hexachlorobenzene	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
Pentachlorophenol	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
Phenanthrene	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
Anthracene	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
di-n-Butylphthalate	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
Fluoranthene	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
Pyrene	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
Butylbenzylphthalate	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
3,3-Dichlorobenzidine	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
Benzo(a)Anthracene	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
Chrysene	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
bis(2-Ethylhexyl)Phthal	40.0	U	mg/Kg	EPA 8270		09/09	10/09	V
di-n-Octylphthalate	40.0	U	mg/Kg	EPA 8270		09/09	10/09	V
Benzo(b)Fluoranthene	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
Benzo(k)Fluoranthene	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
Benzo(a)Pyrene	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
Indeno(1,2,3-cd)Pyrene	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
Dibenz(a,h)Anthracene	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
Benzo(g,h,i)Perylene	40.0	U	mg/Kg	EPA 8270		09/09	10/09	GV
Sample Preparation	---			EPA 3050 Digest				
Total Metals Analysis	---			-				
ICP Screen, ICF				EPA	n/a			
Aluminum	6300		mg/Kg	EPA 6010		08/31	09/02	DLG
Antimony	230	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Arsenic	23	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Barium	110		mg/Kg	EPA 6010		08/31	09/02	DLG
Beryllium	11	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Cadmium	11	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Calcium	2800		mg/Kg	EPA 6010		08/31	09/02	DLG
Chromium	11	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Cobalt	23	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Copper	13		mg/Kg	EPA 6010		08/31	09/02	DLG
Iron	21000		mg/Kg	EPA 6010		08/31	09/02	DLG
Lead	23	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Magnesium	2000		mg/Kg	EPA 6010		08/31	09/02	DLG
Manganese	49		mg/Kg	EPA 6010		08/31	09/02	DLG
Molybdenum	11	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Nickel	23		mg/Kg	EPA 6010		08/31	09/02	DLG
Potassium	1100	U	mg/Kg	EPA 6010		08/31	09/06	LG

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES
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5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

REPORT of ANALYSIS

Chemlab Ref.# :93.4397-4
Client Sample ID :BRW-BKGD-S01 BARROW
Matrix :SOIL

		Qualifier		Comment				
Selenium	23	U	mg/Kg		EPA 6010	08/31	09/02	DLG
Silver	110	U J	mg/Kg	J.1	EPA 6010	08/31	09/02	DLG
Sodium	640		mg/Kg		EPA 6010	08/31	09/06	DLG
Thallium	1.2	U	mg/Kg		EPA 7841	08/30	09/01	KAW
Vanadium	18		mg/Kg		EPA 6010	08/30	09/01	DLG
Zinc	61		mg/Kg		EPA 6010	08/30	09/01	DLG
TOC, Soil	297000		mg/Kg		PSEP Ref Lab			

All chgs 2/15/94
S.L.

* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

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5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
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REPORT of ANALYSIS

Chemlab Ref.# :93.4397-5
Client Sample ID :BRW-BKGD-S02 BARROW
Matrix :SOIL

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70163
Report Completed :10/15/93
Collected :08/26/93 @ 15:00 hrs.
Received :08/28/93 @ 09:35 hrs.
Technical Director:STEPHEN C. EDE
Released By : C. Honstead

Sample Remarks: SAMPLE COLLECTED BY: S.S. SEPPOVEN. HIGH DETECTION LIMIT ON 8270 DUE TO THE FACT THAT THE EXTRACT WAS BLACK AFTER CONCENTRATION. 8260 SAMPLE WAS OVER HOLD TIME AND NOT ANALYZED AS PER CLIENT.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Semivolatile Organics				EPA 8270				
Phenol	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
bis(2-Chloroethyl)ether	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
2-Chlorophenol	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
1,3-Dichlorobenzene	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
1,4-Dichlorobenzene	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
Benzyl Alcohol	18.0	U	mg/Kg	EPA 8270		09/09	10/08	[illegible]
1,2-Dichlorobenzene	18.0	U	mg/Kg	EPA 8270		09/09	10/08	[illegible]
2-Methylphenol	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
bis(2-Chloroisopropyl)e	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
4-Methylphenol	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
n-Nitroso-di-n-Propylam	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
Hexachloroethane	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
Nitrobenzene	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
Isophorone	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
2-Nitrophenol	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
2,4-Dimethylphenol	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
Benzoic Acid	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
bis(2-Chloroethoxy)Meth	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
2,4-Dichlorophenol	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
1,2,4-Trichlorobenzene	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
Naphthalene	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
4-Chloroaniline	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
Hexachlorobutadiene	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
4-Chloro-3-Methylphenol	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
2-Methylnaphthalene	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
Hexachlorocyclopentadie	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
2,4,6-Trichlorophenol	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
2,4,5-Trichlorophenol	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
2-Chloronaphthalene	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
2-Nitroaniline	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
Dimethylphthalate	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
Acenaphthylene	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
2,6-Dinitrotoluene	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
3-Nitroaniline	18.0	U	mg/Kg	EPA 8270		09/09	10/08	[illegible]
Acenaphthene	18.0	U	mg/Kg	EPA 8270		09/09	10/08	[illegible]

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES
SINCE 1908

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4397-5
Client Sample ID :BRW-BKGD-S02 BARROW
Matrix :SOIL

2,4-Dinitrophenol	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
4-Nitrophenol	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
Dibenzofuran	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
2,4-Dinitrotoluene	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
Diethylphthalate	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
4-Chlorophenyl-Phenylet	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
Fluorene	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
4-Nitroaniline	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
4,6-Dinitro-2-Methylphe	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
n-Nitrosodiphenylamine	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
4-Bromophenyl-Phenyleth	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
Hexachlorobenzene	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
Pentachlorophenol	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
Phenanthrene	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
Anthracene	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
di-n-Butylphthalate	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
Fluoranthene	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
Pyrene	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
Butylbenzylphthalate	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
3,3-Dichlorobenzidine	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
Benzo(a)Anthracene	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
Chrysene	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
bis(2-Ethylhexyl)Phthal	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
di-n-Octylphthalate	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
Benzo(b)Fluoranthene	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
Benzo(k)Fluoranthene	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
Benzo(a)Pyrene	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
Indeno(1,2,3-cd)Pyrene	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
Dibenz(a,h)Anthracene	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
Benzo(g,h,i)Perylene	18.0	U	mg/Kg	EPA 8270		09/09	10/08	GV
Sample Preparation	---			EPA 3050 Digest				
Total Metals Analysis	---			-				
ICP Screen, ICF				EPA	n/a			
Aluminum	18000		mg/L	EPA 6010		08/31	09/02	DLG
Antimony	170	U	mg/L	EPA 6010		08/31	09/02	DLG
Arsenic	17	U	mg/L	EPA 6010		08/31	09/02	DLG
Barium	230		mg/L	EPA 6010		08/31	09/02	DLG
Beryllium	8.5	U	mg/L	EPA 6010		08/31	09/02	DLG
Cadmium	8.5	U	mg/L	EPA 6010		08/31	09/02	DLG
Calcium	3100		mg/L	EPA 6010		08/31	09/02	DLG
Chromium	30		mg/L	EPA 6010		08/31	09/02	DLG
Cobalt	17	U	mg/L	EPA 6010		08/31	09/02	DLG
Copper	17		mg/L	EPA 6010		08/31	09/02	DLG
Iron	22000		mg/L	EPA 6010		08/31	09/02	DLG
Lead	17	U	mg/L	EPA 6010		08/31	09/02	DLG
Magnesium	4500		mg/L	EPA 6010		08/31	09/02	DLG
Manganese	86		mg/L	EPA 6010		08/31	09/02	DLG
Molybdenum	8.5	U	mg/L	EPA 6010		08/31	09/02	DLG
Nickel	25		mg/L	EPA 6010		08/31	09/02	DLG
Potassium	2200		mg/L	EPA 6010		08/31	09/06	DLG

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES
SINCE 1908

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4397-5
Client Sample ID :BRW-BKGD-S02 BARROW
Matrix :SOIL

Selenium	170	U	mg/L	EPA 6010	08/31	09/02	DLG
Silver	85	U	mg/L	EPA 6010	08/31	09/02	DLG
Sodium	390		mg/L	EPA 6010	08/31	09/06	DLG
Thallium	0.82	U	mg/L	EPA 7841	08/30	09/01	KAW
Vanadium	48		mg/L	EPA 6010	08/30	09/01	DLG
Zinc	59		mg/L	EPA 6010	08/30	09/01	DLG

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* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

NCE 1908

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

REPORT of ANALYSIS

Chemlab Ref.# :93.4397-6
Client Sample ID :BRW-BKGD-S03 BARROW
Matrix :SOIL

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70163
Report Completed :10/15/93
Collected :08/26/93 @ 15:15 hrs.
Received :08/28/93 @ 09:35 hrs.
Technical Director:STEPHEN C. EDE
Released By : C. Honesteel

Sample Remarks: SAMPLE COLLECTED BY: S.S. SEPPOVEN. HIGH DETECTION LIMIT ON 8270 DUE TO THE FACT THAT THE EXTRACT WAS BLACK AFTER CONCENTRATION. 8260 SAMPLE WAS OVER HOLD TIME AND NOT ANALYZED AS PER CLIENT.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Semivolatile Organics				EPA 8270				
Phenol	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
bis(2-Chloroethyl)ether	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
2-Chlorophenol	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
1,3-Dichlorobenzene	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
1,4-Dichlorobenzene	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
Benzyl Alcohol	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
,2-Dichlorobenzene	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
-Methylphenol	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
bis(2-Chloroisopropyl)e	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
4-Methylphenol	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
n-Nitroso-di-n-Propylam	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
Hexachloroethane	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
Nitrobenzene	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
Isophorone	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
2-Nitrophenol	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
2,4-Dimethylphenol	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
Benzoic Acid	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
bis(2-Chloroethoxy)Meth	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
2,4-Dichlorophenol	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
1,2,4-Trichlorobenzene	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
Naphthalene	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
4-Chloroaniline	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
Hexachlorobutadiene	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
4-Chloro-3-Methylphenol	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
2-Methylnaphthalene	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
Hexachlorocyclopentadie	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
2,4,6-Trichlorophenol	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
2,4,5-Trichlorophenol	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
2-Chloronaphthalene	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
2-Nitroaniline	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
Dimethylphthalate	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
Acenaphthylene	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
2,6-Dinitrotoluene	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
3-Nitroaniline	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
enaphthene	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES
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REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4397-6
Client Sample ID :BRW-BKGD-S03 BARROW
Matrix :SOIL

2,4-Dinitrophenol	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
4-Nitrophenol	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
Dibenzofuran	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
2,4-Dinitrotoluene	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
Diethylphthalate	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
4-Chlorophenyl-Phenylet	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
Fluorene	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
4-Nitroaniline	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
4,6-Dinitro-2-Methylphe	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
n-Nitrosodiphenylamine	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
4-Bromophenyl-Phenyleth	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
Hexachlorobenzene	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
Pentachlorophenol	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
Phenanthrene	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
Anthracene	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
di-n-Butylphthalate	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
Fluoranthene	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
Pyrene	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
Butylbenzylphthalate	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
3,3-Dichlorobenzidine	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
Benzo(a)Anthracene	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
Chrysene	3.95	U	mg/Kg	EPA 8270		09/09	10/10	[illegible]
bis(2-Ethylhexyl)Phthal	3.95	U	mg/Kg	EPA 8270		09/09	10/10	[illegible]
di-n-Octylphthalate	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
Benzo(b)Fluoranthene	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
Benzo(k)Fluoranthene	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
Benzo(a)Pyrene	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
Indeno(1,2,3-cd)Pyrene	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
Dibenz(a,h)Anthracene	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
Benzo(g,h,i)Perylene	3.95	U	mg/Kg	EPA 8270		09/09	10/10	GV
Sample Preparation	---			EPA 3050 Digest				
Total Metals Analysis	---			-				
ICP Screen, ICF				EPA	n/a			
Aluminum	15000		mg/L	EPA 6010		08/31	09/02	DLG
Antimony	75	U	mg/L	EPA 6010		08/31	09/02	DLG
Arsenic	7.5	U	mg/L	EPA 6010		08/31	09/02	DLG
Barium	220		mg/L	EPA 6010		08/31	09/02	DLG
Beryllium	3.8	U	mg/L	EPA 6010		08/31	09/02	DLG
Cadmium	3.8	U	mg/L	EPA 6010		08/31	09/02	DLG
Calcium	2700		mg/L	EPA 6010		08/31	09/02	DLG
Chromium	24		mg/L	EPA 6010		08/31	09/02	DLG
Cobalt	7.5	U	mg/L	EPA 6010		08/31	09/02	DLG
Copper	20		mg/L	EPA 6010		08/31	09/02	DLG
Iron	21000		mg/L	EPA 6010		08/31	09/02	DLG
Lead	9.7		mg/L	EPA 6010		08/31	09/02	DLG
Magnesium	3500		mg/L	EPA 6010		08/31	09/02	DLG
Manganese	90		mg/L	EPA 6010		08/31	09/02	DLG
Molybdenum	3.8	U	mg/L	EPA 6010		08/31	09/02	DLG
Nickel	23		mg/L	EPA 6010		08/31	09/02	DL[illegible]
Potassium	1600		mg/L	EPA 6010		08/31	09/06	D[illegible]

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

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5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

REPORT of ANALYSIS

Chemlab Ref.# :93.4397-6
Client Sample ID :BRW-BKGD-S03 BARROW
Matrix :SOIL

Selenium	75	U	mg/L	EPA 6010	08/31	09/02	DLG
Silver	38	U	mg/L	EPA 6010	08/31	09/02	DLG
Sodium	220		mg/L	EPA 6010	08/31	09/06	DLG
Thallium	0.39	U	mg/L	EPA 7841	08/30	09/01	KAW
Vanadium	41		mg/L	EPA 6010	08/30	09/01	DLG
Zinc	49		mg/L	EPA 6010	08/30	09/01	DLG

See Special Instructions Above
See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4397-7
Client Sample ID :BRW-BKGD-S04 BARROW
Matrix :SOIL

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70163
Report Completed :10/15/93
Collected :08/26/93 @ 15:40 hrs
Received :08/28/93 @ 09:35 hrs
Technical Director:STEPHEN C. EDE
Released By : C. Horstead

Sample Remarks: SAMPLE COLLECTED BY: S.S. SEPPOVEN. HIGH DETECTION LIMIT ØN 8270 DUE TO THE FACT THAT THE EXTRACT WAS BLACK AFTER CONCENTRATION. 8260 SAMPLE WAS OVER HOLD TIME AND NOT ANALYZED AS PER CLIENT.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Semivolatile Organics				EPA 8270				
Phenol	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
bis(2-Chloroethyl)ether	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
2-Chlorophenol	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
1,3-Dichlorobenzene	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
1,4-Dichlorobenzene	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
Benzyl Alcohol	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
1,2-Dichlorobenzene	5.90	U	mg/Kg	EPA 8270		09/09	10/10	[illegible]
2-Methylphenol	5.90	U	mg/Kg	EPA 8270		09/09	10/10	[illegible]
bis(2-Chloroisopropyl)e	5.90	U	mg/Kg	EPA 8270		09/09	10/10	[illegible]
4-Methylphenol	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
n-Nitroso-di-n-Propylam	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
Hexachloroethane	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
Nitrobenzene	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
Isophorone	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
2-Nitrophenol	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
2,4-Dimethylphenol	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
Benzoic Acid	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
bis(2-Chloroethoxy)Meth	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
2,4-Dichlorophenol	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
1,2,4-Trichlorobenzene	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
Naphthalene	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
4-Chloroaniline	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
Hexachlorobutadiene	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
4-Chloro-3-Methylphenol	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
2-Methylnaphthalene	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
Hexachlorocyclopentadie	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
2,4,6-Trichlorophenol	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
2,4,5-Trichlorophenol	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
2-Chloronaphthalene	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
2-Nitroaniline	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
Dimethylphthalate	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
Acenaphthylene	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
2,6-Dinitrotoluene	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
3-Nitroaniline	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
Acenaphthene	5.90	U	mg/Kg	EPA 8270		09/09	10/10	[illegible]

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

Chemlab Ref.# :93.4397-7
Client Sample ID :BRW-BKGD-S04 BARROW
Matrix :SOIL

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

2,4-Dinitrophenol	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
4-Nitrophenol	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
Dibenzofuran	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
2,4-Dinitrotoluene	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
Diethylphthalate	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
4-Chlorophenyl-Phenylet	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
Fluorene	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
4-Nitroaniline	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
4,6-Dinitro-2-Methylphe	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
n-Nitrosodiphenylamine	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
4-Bromophenyl-Phenyleth	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
Hexachlorobenzene	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
Pentachlorophenol	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
Phenanthrene	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
Anthracene	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
di-n-Butylphthalate	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
Fluoranthene	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
Pyrene	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
Butylbenzylphthalate	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
3,3-Dichlorobenzidine	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
Benzo(a)Anthracene	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
Chrysene	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
bis(2-Ethylhexyl)Phthal	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
di-n-Octylphthalate	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
Benzo(b)Fluoranthene	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
Benzo(k)Fluoranthene	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
Benzo(a)Pyrene	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
Indeno(1,2,3-cd)Pyrene	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
Dibenz(a,h)Anthracene	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
Benzo(g,h,i)Perylene	5.90	U	mg/Kg	EPA 8270		09/09	10/10	GV
Sample Preparation	---			EPA 3050 Digest				
Total Metals Analysis	---			-				
ICP Screen, ICF				EPA	n/a			
Aluminum	14000		mg/Kg	EPA 6010		08/31	09/02	DLG
Antimony	69	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Arsenic	6.9	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Barium	150		mg/Kg	EPA 6010		08/31	09/02	DLG
Beryllium	3.4	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Cadmium	3.4	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Calcium	1700		mg/Kg	EPA 6010		08/31	09/02	DLG
Chromium	24		mg/Kg	EPA 6010		08/31	09/02	DLG
Cobalt	6.9	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Copper	18		mg/Kg	EPA 6010		08/31	09/02	DLG
Iron	19000		mg/Kg	EPA 6010		08/31	09/02	DLG
Lead	8.7		mg/Kg	EPA 6010		08/31	09/02	DLG
Magnesium	3200		mg/Kg	EPA 6010		08/31	09/02	DLG
Manganese	74		mg/Kg	EPA 6010		08/31	09/02	DLG
Molybdenum	3.4	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Nickel	23		mg/Kg	EPA 6010		08/31	09/02	DLG
Potassium	2000		mg/Kg	EPA 6010		08/31	09/06	DLG

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4397-7
Client Sample ID :BRW-BKGD-S04 BARROW
Matrix :SOIL

Selenium	69	U	mg/Kg	EPA 6010	08/31	09/02	DLG
Silver	34	U	mg/Kg	EPA 6010	08/31	09/02	DLG
Sodium	190		mg/Kg	EPA 6010	08/31	09/06	DLG
Thallium	0.32	U	mg/Kg	EPA 7841	08/30	09/01	KAW
Vanadium	44		mg/Kg	EPA 6010	08/30	09/01	DLG
Zinc	51		mg/Kg	EPA 6010	08/30	09/01	DLG

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* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.

ENVIRONMENTAL LABORATORY SERVICES

SINCE 1908

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4397-1
Client Sample ID :BRW-BKGD-SD01 BARROW
Matrix :SOIL

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70163
Report Completed :10/15/93
Collected :08/26/93 @ 13:55 hrs.
Received :08/28/93 @ 09:35 hrs.
Technical Director:STEPHEN C. EDE
Released By : C. Homestead

Sample Remarks: SAMPLE COLLECTED BY: S.S. SEPPOVEN. HIGH DETECTION LIMIT ON 8270 DUE TO THE FACT THAT THE EXTRACT WAS BLACK AFTER CONCENTRATION.

Qualifiers/Comments

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Volatile Organics				EPA 8260				
Benzene	0.050	U	mg/Kg	EPA 8260 (J)-A.1		08/30	09/14	KWM
Bromobenzene	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Bromochloromethane	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Bromodichloromethane	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Bromoform	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Bromomethane	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
n-Butylbenzene	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
sec-Butylbenzene	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
tert-Butylbenzne	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Carbon Tetrachloride	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Chlorobenzene	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Chloroethane	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Chloroform	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Chloromethane	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
2-Chlorotoluene	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
4-Chlorotoluene	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Dibromochloromethane	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
12Dibromo3Chloropropane	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
1,2-Dibromoethane	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Dibromomethane	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
1,2-Dichlorobenzene	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
1,3-Dichlorobenzene	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
1,4-Dichlorobenzene	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Dichlorodifluoromethane	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
1,1-Dichloroethane	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
1,2-Dichloroethane	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
1,1-Dichloroethene	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
cis-1,2-Dichloroethene	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
trans1,2-Dichloroethene	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
1,2-Dichloropropane	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
1,3-Dichloropropane	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
2,2-Dichloropropane	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
1,1-Dichloropropene	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Ethylbenzene	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Hexachlorobutadiene	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Isopropylbenzene	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM

2-22-94

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES
SINCE 1908

REPORT of ANALYSIS

5633 B St
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4397-1
Client Sample ID :BRW-BKGD-SD01 BARROW
Matrix :SOIL

Qualifier Statement

p-Isopropyltoluene	0.050	U	mg/Kg	EPA 8260 (J)-A.1	08/30	09/14	KWM
Methylene Chloride	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
Napthalene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
n-Propylbenzene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
Styrene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
1112-Tetrachloroethane	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
1122-Tetrachloroethane	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
Tetrachloroethene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
Toluene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
1,2,3-Trichlorobenzene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
1,2,4-Trichlorobenzene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
1,1,1-Trichloroethane	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
1,1,2-Trichloroethane	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
Trichloroethene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
Trichlorofluoromethane	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
1,2,3-Trichloropropane	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
1,2,4-Trimethylbenzene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
1,3,5-Trimethylbenzene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
Vinyl Chloride	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
p+m-Xylene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
o-Xylene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
Semivolatile Organics				EPA 8270			
Phenol	3.80	U	mg/Kg	EPA 8270	09/09	10/09	V
bis(2-Chloroethyl)ether	3.80	U	mg/Kg	EPA 8270	09/09	10/09	GV
2-Chlorophenol	3.80	U	mg/Kg	EPA 8270	09/09	10/09	GV
1,3-Dichlorobenzene	3.80	U	mg/Kg	EPA 8270	09/09	10/09	GV
1,4-Dichlorobenzene	3.80	U	mg/Kg	EPA 8270	09/09	10/09	GV
Benzyl Alcohol	3.80	U	mg/Kg	EPA 8270	09/09	10/09	GV
1,2-Dichlorobenzene	3.80	U	mg/Kg	EPA 8270	09/09	10/09	GV
2-Methylphenol	3.80	U	mg/Kg	EPA 8270	09/09	10/09	GV
bis(2-Chloroisopropyl)e	3.80	U	mg/Kg	EPA 8270	09/09	10/09	GV
4-Methylphenol	3.80	U	mg/Kg	EPA 8270	09/09	10/09	GV
n-Nitroso-di-n-Propylam	3.80	U	mg/Kg	EPA 8270	09/09	10/09	GV
Hexachloroethane	3.80	U	mg/Kg	EPA 8270	09/09	10/09	GV
Nitrobenzene	3.80	U	mg/Kg	EPA 8270	09/09	10/09	GV
Isophorone	3.80	U	mg/Kg	EPA 8270	09/09	10/09	GV
2-Nitrophenol	3.80	U	mg/Kg	EPA 8270	09/09	10/09	GV
2,4-Dimethylphenol	3.80	U	mg/Kg	EPA 8270	09/09	10/09	GV
Benzoic Acid	3.80	U	mg/Kg	EPA 8270	09/09	10/09	GV
bis(2-Chloroethoxy)Meth	3.80	U	mg/Kg	EPA 8270	09/09	10/09	GV
2,4-Dichlorophenol	3.80	U	mg/Kg	EPA 8270	09/09	10/09	GV
1,2,4-Trichlorobenzene	3.80	U	mg/Kg	EPA 8270	09/09	10/09	GV
Naphthalene	3.80	U	mg/Kg	EPA 8270	09/09	10/09	GV
4-Chloroaniline	3.80	U	mg/Kg	EPA 8270	09/09	10/09	GV
Hexachlorobutadiene	3.80	U	mg/Kg	EPA 8270	09/09	10/09	GV
4-Chloro-3-Methylphenol	3.80	U	mg/Kg	EPA 8270	09/09	10/09	GV
2-Methylnaphthalene	3.80	U	mg/Kg	EPA 8270	09/09	10/09	GV
Hexachlorocyclopentadie	3.80	U	mg/Kg	EPA 8270	09/09	10/09	GV
2,4,6-Trichlorophenol	3.80	U	mg/Kg	EPA 8270	09/09	10/09	GV
2,4,5-Trichlorophenol	3.80	U	mg/Kg	EPA 8270	09/09	10/09	V

OR
2.22.94

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES
SINCE 1908

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4397-1
Client Sample ID :BRW-BKGD-SD01 BARROW
Matrix :SOIL

2-Chloronaphthalene	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
2-Nitroaniline	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
Dimethylphthalate	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
Acenaphthylene	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
2,6-Dinitrotoluene	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
3-Nitroaniline	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
Acenaphthene	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
2,4-Dinitrophenol	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
4-Nitrophenol	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
Dibenzofuran	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
2,4-Dinitrotoluene	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
Diethylphthalate	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
4-Chlorophenyl-Phenylet	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
Fluorene	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
4-Nitroaniline	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
4,6-Dinitro-2-Methylphe	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
n-Nitrosodiphenylamine	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
4-Bromophenyl-Phenyleth	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
Hexachlorobenzene	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
Pentachlorophenol	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
Phenanthrene	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
Anthracene	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
Di-n-Butylphthalate	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
Fluoranthene	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
Pyrene	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
Butylbenzylphthalate	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
3,3-Dichlorobenzidine	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
Benzo(a)Anthracene	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
Chrysene	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
bis(2-Ethylhexyl)Phthal	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
di-n-Octylphthalate	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
Benzo(b)Fluoranthene	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
Benzo(k)Fluoranthene	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
Benzo(a)Pyrene	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
Indeno(1,2,3-cd)Pyrene	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
Dibenz(a,h)Anthracene	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
Benzo(g,h,i)Perylene	3.80	U	mg/Kg	EPA 8270		09/09	10/09	GV
Sample Preparation	---			EPA 3050 Digest				
Total Metals Analysis	---			-				
ICP Screen, ICP				EPA	n/a			
Aluminum	11000		mg/Kg	EPA 6010		08/31	09/02	DLG
Antimony	120	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Arsenic	12	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Barium	180		mg/Kg	EPA 6010		08/31	09/02	DLG
Beryllium	5.8	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Cadmium	5.8	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Calcium	5700		mg/Kg	EPA 6010		08/31	09/02	DLG
Chromium	19		mg/Kg	EPA 6010		08/31	09/02	DLG
Cobalt	12	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Copper	17		mg/Kg	EPA 6010		08/31	09/02	DLG

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

SINCE 1908

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4397-1
Client Sample ID :BRW-BKGD-SD01 BARROW
Matrix :SOIL

		Qualifier		Comment				
Iron	22000		mg/Kg		EPA 6010	08/31	09/02	DLG
Lead	12	U	mg/Kg		EPA 6010	08/31	09/02	DLG
Magnesium	3600		mg/Kg		EPA 6010	08/31	09/02	DLG
Manganese	240		mg/Kg		EPA 6010	08/31	09/02	DLG
Molybdenum	5.8	U	mg/Kg		EPA 6010	08/31	09/02	DLG
Nickel	24		mg/Kg		EPA 6010	08/31	09/02	DLG
Potassium	2000		mg/Kg		EPA 6010	08/31	09/06	DLG
Selenium	120	U	mg/Kg		EPA 6010	08/31	09/02	DLG
Silver	58	U J	mg/Kg	J.1	EPA 6010	08/31	09/02	DLG
Sodium	310		mg/Kg		EPA 6010	08/31	09/06	DLG
Thallium	0.55	U	mg/Kg		EPA 7841	08/30	09/01	KAW
Vanadium	39		mg/Kg		EPA 6010	08/30	09/02	DLG
Zinc	59		mg/Kg		EPA 6010	08/30	09/02	DLG
TOC, Soil	84200		mg/Kg		PSEP Ref Lab			

All chngs n.c 2/15/94

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* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4397-3
Client Sample ID :BRW-BKGD-SD01 BARROW DUPLICATE
Matrix :SOIL

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70163
Report Completed :10/15/93
Collected :08/26/93 @ 13:55 hrs.
Received :08/28/93 @ 09:35 hrs.
Technical Director:STEPHEN C. EDE
Released By : C. Homestead

Sample Remarks: SAMPLE COLLECTED BY: S.S. SEPPOVEN.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Sample Preparation	---		mg/Kg	EPA 3050 Digest				
Total Metals Analysis	---			-				
ICP Screen, ICF				EPA	n/a			
Aluminum	13000		mg/Kg	EPA 6010		08/31	09/02	DLG
Antimony	110	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Arsenic	11	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Barium	190		mg/Kg	EPA 6010		08/31	09/02	DLG
Beryllium	5.7	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Cadmium	5.7	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Calcium	5700		mg/Kg	EPA 6010		08/31	09/02	DLG
Chromium	22		mg/Kg	EPA 6010		08/31	09/02	DLG
Cobalt	11	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Copper	18		mg/Kg	EPA 6010		08/31	09/02	DLG
Iron	24000		mg/Kg	EPA 6010		08/31	09/02	DLG
Lead	11	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Magnesium	3900		mg/Kg	EPA 6010		08/31	09/02	DLG
Manganese	240		mg/Kg	EPA 6010		08/31	09/02	DLG
Molybdenum	5.7	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Nickel	26		mg/Kg	EPA 6010		08/31	09/02	DLG
Potassium	2200		mg/Kg	EPA 6010		08/31	09/02	DLG
Selenium	110	U	mg/Kg	EPA 6010		08/31	09/06	DLG
Silver	57	U	mg/Kg	EPA 6010		08/31	09/02	DLG
Sodium	320		mg/Kg	EPA 6010		08/31	09/02	DLG
Thallium	0.64	U	mg/Kg	EPA 7841		08/30	09/01	KAW
Vanadium	44		mg/Kg	EPA 6010		08/30	09/01	DLG
Zinc	65		mg/Kg	EPA 6010		08/30	09/01	DLG

* See Special Instructions Above
See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

REPORT of ANALYSIS

Chemlab Ref.# :93.4397-2
Client Sample ID :BRW-BKGD-SD01 BARROW SPIKE
Matrix :SOIL

Client Name	:ICF KAISER ENGINEERING	WORK Order	:70163
Ordered By	:RAY MORRIS	Report Completed	:10/15/93
Project Name	:DEW LINE RI/FS BARROW	Collected	:08/26/93 @ 13:55 hrs.
Project#	:41096-412-01	Received	:08/28/93 @ 09:35 hrs.
PWSID	:UA	Technical Director	:STEPHEN C. EDE
		Released By	:

Sample Remarks: SAMPLE COLLECTED BY: S.S. SEPPOVEN. FOR 8260/8270 SPIKE AND SPIKE DUPLICATE RECOVERY AND RPD, SEE QC SUMMARY. J = INDICATES AN ANALYTE WHOSE CONCENTRATION IS ESTIMATED BECAUSE THE ANALYTE'S CONCENTRATION IS DETECTED BELOW THE CALIBRATION RANGE.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Volatile Organics				EPA 8260				
Benzene	0.492		mg/Kg	EPA 8260		08/30	09/14	KWM
Bromobenzene	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Bromochloromethane	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Bromodichloromethane	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Bromoform	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Bromomethane	0.050	U	mg/Kg	EPA 8260		08/30	09/14	[illegible]
n-Butylbenzene	0.050	U	mg/Kg	EPA 8260		08/30	09/14	[illegible]
sec-Butylbenzene	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
tert-Butylbenzne	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Carbon Tetrachloride	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Chlorobenzene	0.525		mg/Kg	EPA 8260		08/30	09/14	KWM
Chloroethane	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Chloroform	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Chloromethane	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
2-Chlorotoluene	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
4-Chlorotoluene	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Dibromochloromethane	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
12Dibromo3Chloropropane	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
1,2-Dibromoethane	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Dibromomethane	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
1,2-Dichlorobenzene	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
1,3-Dichlorobenzene	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
1,4-Dichlorobenzene	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Dichlorodifluoromethane	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
1,1-Dichloroethane	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
1,2-Dichloroethane	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
1,1-Dichloroethene	0.077		mg/Kg	EPA 8260		08/30	09/14	KWM
cis-1,2-Dichloroethene	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
trans1,2-Dichloroethene	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
1,2-Dichloropropane	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
1,3-Dichloropropane	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
2,2-Dichloropropane	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
1,1-Dichloropropene	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Ethylbenzene	0.050	U	mg/Kg	EPA 8260		08/30	09/14	[illegible]

COMMERCIAL TESTING & ENGINEERING CO.
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REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4397-2
Client Sample ID :BRW-BKGD-SD01 BARROW SPIKE
Matrix :SOIL

Hexachlorobutadiene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
Isopropylbenzene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
p-Isopropyltoluene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
Methylene Chloride	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
Napthalene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
n-Propylbenzene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
Styrene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
1112-Tetrachloroethane	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
1122-Tetrachloroethane	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
Tetrachloroethene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
Toluene	0.592		mg/Kg	EPA 8260	08/30	09/14	KWM
1,2,3-Trichlorobenzene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
1,2,4-Trichlorobenzene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
1,1,1-Trichloroethane	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
1,1,2-Trichloroethane	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
Trichloroethene	0.356		mg/Kg	EPA 8260	08/30	09/14	KWM
Trichlorofluoromethane	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
1,2,3-Trichloropropane	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
1,2,4-Trimethylbenzene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
1,3,5-Trimethylbenzene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
Vinyl Chloride	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
p+m-Xylene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
o-Xylene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
Semivolatile Organics				EPA 8270			
Phenol	8.59	J	mg/Kg	EPA 8270	09/09	10/09	GV
bis(2-Chloroethyl)ether	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
2-Chlorophenol	7.44	J	mg/Kg	EPA 8270	09/09	10/09	GV
1,3-Dichlorobenzene	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
1,4-Dichlorobenzene	6.60	J	mg/Kg	EPA 8270	09/09	10/09	GV
Benzyl Alcohol	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
1,2-Dichlorobenzene	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
2-Methylphenol	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
bis(2-Chloroisopropyl)e	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
4-Methylphenol	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
n-Nitroso-di-n-Propylam	9.02		mg/Kg	EPA 8270	09/09	10/09	GV
Hexachloroethane	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
Nitrobenzene	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
Isophorone	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
2-Nitrophenol	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
2,4-Dimethylphenol	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
Benzoic Acid	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
bis(2-Chloroethoxy)Meth	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
2,4-Dichlorophenol	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
1,2,4-Trichlorobenzene	7.17	J	mg/Kg	EPA 8270	09/09	10/09	GV
Naphthalene	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
4-Chloroaniline	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
Hexachlorobutadiene	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
4-Chloro-3-Methylphenol	7.48	J	mg/Kg	EPA 8270	09/09	10/09	GV
2-Methylnaphthalene	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
Hexachlorocyclopentadie	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV

COMMERCIAL TESTING & ENGINEERING CO.
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REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4397-2
Client Sample ID :BRW-BKGD-SD01 BARROW SPIKE
Matrix :SOIL

2,4,6-Trichlorophenol	9.00	U	mg/Kg	EPA 8270		09/09	10/09	GV
2,4,5-Trichlorophenol	9.00	U	mg/Kg	EPA 8270		09/09	10/09	GV
2-Chloronaphthalene	9.00	U	mg/Kg	EPA 8270		09/09	10/09	GV
2-Nitroaniline	9.00	U	mg/Kg	EPA 8270		09/09	10/09	GV
Dimethylphthalate	9.00	U	mg/Kg	EPA 8270		09/09	10/09	GV
Acenaphthylene	9.00	U	mg/Kg	EPA 8270		09/09	10/09	GV
2,6-Dinitrotoluene	9.00	U	mg/Kg	EPA 8270		09/09	10/09	GV
3-Nitroaniline	9.00	U	mg/Kg	EPA 8270		09/09	10/09	GV
Acenaphthene	7.20	J	mg/Kg	EPA 8270		09/09	10/09	GV
2,4-Dinitrophenol	9.00	U	mg/Kg	EPA 8270		09/09	10/09	GV
4-Nitrophenol	7.56	J	mg/Kg	EPA 8270		09/09	10/09	GV
Dibenzofuran	9.00	U	mg/Kg	EPA 8270		09/09	10/09	GV
2,4-Dinitrotoluene	7.01	J	mg/Kg	EPA 8270		09/09	10/09	GV
Diethylphthalate	9.00	U	mg/Kg	EPA 8270		09/09	10/09	GV
4-Chlorophenyl-Phenylet	9.00	U	mg/Kg	EPA 8270		09/09	10/09	GV
Fluorene	9.00	U	mg/Kg	EPA 8270		09/09	10/09	GV
4-Nitroaniline	9.00	U	mg/Kg	EPA 8270		09/09	10/09	GV
4,6-Dinitro-2-Methylphe	9.00	U	mg/Kg	EPA 8270		09/09	10/09	GV
n-Nitrosodiphenylamine	9.00	U	mg/Kg	EPA 8270		09/09	10/09	GV
4-Bromophenyl-Phenyleth	9.00	U	mg/Kg	EPA 8270		09/09	10/09	GV
Hexachlorobenzene	9.00	U	mg/Kg	EPA 8270		09/09	10/09	GV
Pentachlorophenol	1.34	J	mg/Kg	EPA 8270		09/09	10/09	GV
Phenanthrene	9.00	U	mg/Kg	EPA 8270		09/09	10/09	
Anthracene	9.00	U	mg/Kg	EPA 8270		09/09	10/09	
di-n-Butylphthalate	9.48	J	mg/Kg	EPA 8270		09/09	10/09	GV
Fluoranthene	9.00	U	mg/Kg	EPA 8270		09/09	10/09	GV
Pyrene	7.77	J	mg/Kg	EPA 8270		09/09	10/09	GV
Butylbenzylphthalate	9.00	U	mg/Kg	EPA 8270		09/09	10/09	GV
3,3-Dichlorobenzidine	9.00	U	mg/Kg	EPA 8270		09/09	10/09	GV
Benzo(a)Anthracene	9.00	U	mg/Kg	EPA 8270		09/09	10/09	GV
Chrysene	9.00	U	mg/Kg	EPA 8270		09/09	10/09	GV
bis(2-Ethylhexyl)Phthal	9.00	U	mg/Kg	EPA 8270		09/09	10/09	GV
di-n-Octylphthalate	9.00	U	mg/Kg	EPA 8270		09/09	10/09	GV
Benzo(b)Fluoranthene	9.00	U	mg/Kg	EPA 8270		09/09	10/09	GV
Benzo(k)Fluoranthene	9.00	U	mg/Kg	EPA 8270		09/09	10/09	GV
Benzo(a)Pyrene	9.00	U	mg/Kg	EPA 8270		09/09	10/09	GV
Indeno(1,2,3-cd)Pyrene	9.00	U	mg/Kg	EPA 8270		09/09	10/09	GV
Dibenz(a,h)Anthracene	9.00	U	mg/Kg	EPA 8270		09/09	10/09	GV
Benzo(g,h,i)Perylene	9.00	U	mg/Kg	EPA 8270		09/09	10/09	GV
Sample Preparation	---			EPA 3050 Digest				
Total Metals Analysis	---			-				
ICP Screen, ICF				EPA	n/a			
Aluminum	15000		mg/Kg	EPA 6010		08/31	09/02	DLG
Antimony	1100		mg/Kg	EPA 6010		08/31	09/02	DLG
Arsenic	220		mg/Kg	EPA 6010		08/31	09/02	DLG
Barium	420		mg/Kg	EPA 6010		08/31	09/02	DLG
Beryllium	84		mg/Kg	EPA 6010		08/31	09/02	DLG
Cadmium	110		mg/Kg	EPA 6010		08/31	09/02	DLG
Calcium	7800		mg/Kg	EPA 6010		08/31	09/02	DLG
Chromium	240		mg/Kg	EPA 6010		08/31	09/02	[illegible]

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4397-2
Client Sample ID :BRW-BKGD-SD01 BARROW SPIKE
Matrix :SOIL

Cobalt	220	mg/Kg	EPA 6010	08/31	09/02	DLG
Copper	220	mg/Kg	EPA 6010	08/31	09/02	DLG
Iron	24000	mg/Kg	EPA 6010	08/31	09/02	DLG
Lead	200	mg/Kg	EPA 6010	08/31	09/02	DLG
Magnesium	6200	mg/Kg	EPA 6010	08/31	09/02	DLG
Manganese	430	mg/Kg	EPA 6010	08/31	09/02	DLG
Molybdenum	200	mg/Kg	EPA 6010	08/31	09/02	DLG
Nickel	230	mg/Kg	EPA 6010	08/31	09/02	DLG
Potassium	5000	mg/Kg	EPA 6010	08/31	09/02	DLG
Selenium	270	mg/Kg	EPA 6010	08/31	09/06	DLG
Silver	200	mg/Kg	EPA 6010	08/31	09/02	DLG
Sodium	2500	mg/Kg	EPA 6010	08/31	09/02	DLG
Thallium	4.1	mg/Kg	EPA 7841	08/30	09/01	KAW
Vanadium	250	mg/Kg	EPA 6010	08/31	09/02	DLG
Zinc	270	mg/Kg	EPA 6010	08/31	09/02	DLG

==

* See Special Instructions Above
See Sample Remarks Above
= Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES
SINCE 1908

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

REPORT of ANALYSIS

Chemlab Ref.# :93.4397-10
Client Sample ID :BRW-BKGD-SD01 BARROW SPIKE DUPLICATE
Matrix :SOIL

Client Name	:ICF KAISER ENGINEERING	WORK Order	:70163
Ordered By	:RAY MORRIS	Report Completed	:10/15/93
Project Name	:DEW LINE RI/FS BARROW	Collected	:08/26/93 @ 13:55 hrs.
Project#	:41096-412-01	Received	:08/28/93 @ 09:35 hrs.
PWSID	:UA	Technical Director	:STEPHEN C. EDE
		Released By	:

Sample Remarks: SAMPLE COLLECTED BY: S.S. SEPPOVEN. J = INDICATES AN ANALYTE WHOSE CONCENTRATION IS ESTIMATED BECAUSE THE ANALYTE'S CONCENTRATION IS DETECTED BELOW THE CALIBRATION RANGE.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Volatile Organics				EPA 8260				
Benzene	0.497		mg/Kg	EPA 8260		08/30	09/14	KWM
Bromobenzene	0.051	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Bromochloromethane	0.051	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Bromodichloromethane	0.051	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Bromoform	0.051	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Bromomethane	0.051	U	mg/Kg	EPA 8260		08/30	09/14	[illegible]
n-Butylbenzene	0.051	U	mg/Kg	EPA 8260		08/30	09/14	[illegible]
sec-Butylbenzene	0.051	U	mg/Kg	EPA 8260		08/30	09/14	KWM
tert-Butylbenzne	0.051	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Carbon Tetrachloride	0.051	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Chlorobenzene	0.522		mg/Kg	EPA 8260		08/30	09/14	KWM
Chloroethane	0.051	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Chloroform	0.051	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Chloromethane	0.051	U	mg/Kg	EPA 8260		08/30	09/14	KWM
2-Chlorotoluene	0.051	U	mg/Kg	EPA 8260		08/30	09/14	KWM
4-Chlorotoluene	0.051	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Dibromochloromethane	0.051	U	mg/Kg	EPA 8260		08/30	09/14	KWM
12Dibromo3Chloropropane	0.051	U	mg/Kg	EPA 8260		08/30	09/14	KWM
1,2-Dibromoethane	0.051	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Dibromomethane	0.051	U	mg/Kg	EPA 8260		08/30	09/14	KWM
1,2-Dichlorobenzene	0.051	U	mg/Kg	EPA 8260		08/30	09/14	KWM
1,3-Dichlorobenzene	0.051	U	mg/Kg	EPA 8260		08/30	09/14	KWM
1,4-Dichlorobenzene	0.051	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Dichlorodifluoromethane	0.051	U	mg/Kg	EPA 8260		08/30	09/14	KWM
1,1-Dichloroethane	0.051	U	mg/Kg	EPA 8260		08/30	09/14	KWM
1,2-Dichloroethane	0.051	U	mg/Kg	EPA 8260		08/30	09/14	KWM
1,1-Dichloroethene	0.089		mg/Kg	EPA 8260		08/30	09/14	KWM
cis-1,2-Dichloroethene	0.051	U	mg/Kg	EPA 8260		08/30	09/14	KWM
trans1,2-Dichloroethene	0.051	U	mg/Kg	EPA 8260		08/30	09/14	KWM
1,2-Dichloropropane	0.051	U	mg/Kg	EPA 8260		08/30	09/14	KWM
1,3-Dichloropropane	0.051	U	mg/Kg	EPA 8260		08/30	09/14	KWM
2,2-Dichloropropane	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
1,1-Dichloropropene	0.050	U	mg/Kg	EPA 8260		08/30	09/14	KWM
Ethylbenzene	0.050	U	mg/Kg	EPA 8260		08/30	09/14	[illegible]
Hexachlorobutadiene	0.050	U	mg/Kg	EPA 8260		08/30	09/14	[illegible]

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES
SINCE 1908

REPORT of ANALYSIS

5633 B STREET
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TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4397-10
Client Sample ID :BRW-BKGD-SD01 BARROW SPIKE DUPLICATE
Matrix :SOIL

Isopropylbenzene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
p-Isopropyltoluene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
Methylene Chloride	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
Napthalene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
n-Propylbenzene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
Styrene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
1112-Tetrachloroethane	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
1122-Tetrachloroethane	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
Tetrachloroethene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
Toluene	0.577		mg/Kg	EPA 8260	08/30	09/14	KWM
1,2,3-Trichlorobenzene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
1,2,4-Trichlorobenzene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
1,1,1-Trichloroethane	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
1,1,2-Trichloroethane	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
Trichloroethene	0.367		mg/Kg	EPA 8260	08/30	09/14	KWM
Trichlorofluoromethane	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
1,2,3-Trichloropropane	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
1,2,4-Trimethylbenzene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
1,3,5-Trimethylbenzene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
Vinyl Chloride	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
p+m-Xylene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
o-Xylene	0.050	U	mg/Kg	EPA 8260	08/30	09/14	KWM
Semivolatile Organics				EPA 8270			
Phenol	9.08	J	mg/Kg	EPA 8270	09/09	10/09	GV
bis(2-Chloroethyl)ether	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
2-Chlorophenol	7.65	J	mg/Kg	EPA 8270	09/09	10/09	GV
1,3-Dichlorobenzene	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
1,4-Dichlorobenzene	6.27	J	mg/Kg	EPA 8270	09/09	10/09	GV
Benzyl Alcohol	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
1,2-Dichlorobenzene	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
2-Methylphenol	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
bis(2-Chloroisopropyl)e	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
4-Methylphenol	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
n-Nitroso-di-n-Propylam	10.6		mg/Kg	EPA 8270	09/09	10/09	GV
Hexachloroethane	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
Nitrobenzene	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
Isophorone	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
2-Nitrophenol	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
2,4-Dimethylphenol	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
Benzoic Acid	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
bis(2-Chloroethoxy)Meth	7.51	J	mg/Kg	EPA 8270	09/09	10/09	GV
2,4-Dichlorophenol	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
1,2,4-Trichlorobenzene	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
Naphthalene	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
4-Chloroaniline	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
Hexachlorobutadiene	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
4-Chloro-3-Methylphenol	8.52	J	mg/Kg	EPA 8270	09/09	10/09	GV
2-Methylnaphthalene	9.15	U	mg/Kg	EPA 8270	09/09	10/09	GV
Hexachlorocyclopentadie	9.15	U	mg/Kg	EPA 8270	09/09	10/09	GV
2,4,6-Trichlorophenol	9.15	U	mg/Kg	EPA 8270	09/09	10/09	GV

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

SINCE 1908

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4397-10
Client Sample ID :BRW-BKGD-SD01 BARROW SPIKE DUPLICATE
Matrix :SOIL

2,4,5-Trichlorophenol	9.15	U	mg/Kg	EPA 8270	09/09	10/09	GV
2-Chloronaphthalene	9.15	U	mg/Kg	EPA 8270	09/09	10/09	GV
2-Nitroaniline	9.15	U	mg/Kg	EPA 8270	09/09	10/09	GV
Dimethylphthalate	9.15	U	mg/Kg	EPA 8270	09/09	10/09	GV
Acenaphthylene	9.15	U	mg/Kg	EPA 8270	09/09	10/09	GV
2,6-Dinitrotoluene	9.15	U	mg/Kg	EPA 8270	09/09	10/09	GV
3-Nitroaniline	9.15	U	mg/Kg	EPA 8270	09/09	10/09	GV
Acenaphthene	8.13	J	mg/Kg	EPA 8270	09/09	10/09	GV
2,4-Dinitrophenol	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
4-Nitrophenol	7.65	J	mg/Kg	EPA 8270	09/09	10/09	GV
Dibenzofuran	9.15	U	mg/Kg	EPA 8270	09/09	10/09	GV
2,4-Dinitrotoluene	7.98	J	mg/Kg	EPA 8270	09/09	10/09	GV
Diethylphthalate	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
4-Chlorophenyl-Phenylet	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
Fluorene	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
4-Nitroaniline	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
4,6-Dinitro-2-Methylphe	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
n-Nitrosodiphenylamine	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
4-Bromophenyl-Phenyleth	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
Hexachlorobenzene	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
Pentachlorophenol	2.83	J	mg/Kg	EPA 8270	09/09	10/09	GV
Phenanthrene	9.00	U	mg/Kg	EPA 8270	09/09	10/09	
Anthracene	9.00	U	mg/Kg	EPA 8270	09/09	10/09	
di-n-Butylphthalate	12.3		mg/Kg	EPA 8270	09/09	10/09	GV
Fluoranthene	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
Pyrene	8.98	J	mg/Kg	EPA 8270	09/09	10/09	GV
Butylbenzylphthalate	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
3,3-Dichlorobenzidine	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
Benzo(a)Anthracene	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
Chrysene	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
bis(2-Ethylhexyl)Phthal	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
di-n-Octylphthalate	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
Benzo(b)Fluoranthene	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
Benzo(k)Fluoranthene	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
Benzo(a)Pyrene	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
Indeno(1,2,3-cd)Pyrene	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
Dibenz(a,h)Anthracene	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV
Benzo(g,h,i)Perylene	9.00	U	mg/Kg	EPA 8270	09/09	10/09	GV

* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

5633 B STREET
ANCHORAGE, AK 99518
TEL. (907) 562-2343
FAX (907) 561-5301

REPORT of ANALYSIS

Chemlab Ref.# :93.4395-3
Client Sample ID :BRW-BKGD-SW01 BARROW
Matrix :WATER

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70159
Report Completed :09/29/93
Collected :08/26/93 @ 13:50 hrs.
Received :08/28/93 @ 09:30 hrs.
Technical Director:STEPHEN C. EDE
Released By :

Sample Remarks: SAMPLE COLLECTED BY: D. NOE, JEFF J. DAWSON, AND S.S. SEPPOVEN.
8270: SURROGATE RECOVERY IS LOW FOR THIS SAMPLE.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Volatile Organics				EPA 8260				
Benzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
Bromobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
Bromochloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
Bromodichloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
Bromoform	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
Bromomethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
n-Butylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
sec-Butylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
tert-Butylbenzne	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
Carbon Tetrachloride	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
Chlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
Chloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
Chloroform	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
Chloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
2-Chlorotoluene	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
4-Chlorotoluene	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
Dibromochloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
12Dibromo3Chloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
1,2-Dibromoethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
Dibromomethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
1,2-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
1,3-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
1,4-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
Dichlorodifluoromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
1,1-Dichloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
1,2-Dichloroethane	0.0012		mg/L	EPA 8260		09/03	09/03	SGM
1,1-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
cis-1,2-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
trans1,2-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
1,2-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
1,3-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
2,2-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
1,1-Dichloropropene	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
Ethylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
Hexachlorobutadiene	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM
Isopropylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	SGM

COMMERCIAL TESTING & ENGINEERING CO.

ENVIRONMENTAL LABORATORY SERVICES

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

REPORT of ANALYSIS

Qualifier / Comments

Chemlab Ref.# :93.4395-3
Client Sample ID :BRW-BKGD-SW01 BARROW
Matrix :WATER

p-Isopropyltoluene	0.0010	U	mg/L	EPA 8260	09/03	09/03	SC
Methylene Chloride	0.0010	U	mg/L	EPA 8260	09/03	09/03	SC
Napthalene	0.0010	U	mg/L	EPA 8260	09/03	09/03	SC
n-Propylbenzene	0.0010	U	mg/L	EPA 8260	09/03	09/03	SC
Styrene	0.0010	U	mg/L	EPA 8260	09/03	09/03	SC
1112-Tetrachloroethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	SC
1122-Tetrachloroethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	SC
Tetrachloroethene	0.0010	U	mg/L	EPA 8260	09/03	09/03	SC
Toluene	0.0010	U	mg/L	EPA 8260	09/03	09/03	SC
1,2,3-Trichlorobenzene	0.0010	U	mg/L	EPA 8260	09/03	09/03	SC
1,2,4-Trichlorobenzene	0.0010	U	mg/L	EPA 8260	09/03	09/03	SC
1,1,1-Trichloroethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	SC
1,1,2-Trichloroethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	SC
Trichloroethene	0.0010	U	mg/L	EPA 8260	09/03	09/03	SC
Trichlorofluoromethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	SC
1,2,3-Trichloropropane	0.0010	U	mg/L	EPA 8260	09/03	09/03	SC
1,2,4-Trimethylbenzene	0.0010	U	mg/L	EPA 8260	09/03	09/03	SC
1,3,5-Trimethylbenzene	0.0010	U	mg/L	EPA 8260	09/03	09/03	SC
Vinyl Chloride	0.0010	U	mg/L	EPA 8260	09/03	09/03	SC
p+m-Xylene	0.0010	U	mg/L	EPA 8260	09/03	09/03	SC
o-Xylene	0.0010	U	mg/L	EPA 8260	09/03	09/0	SC
Semivolatile Organics				EPA 8270			
Phenol	0.010	U	mg/L	EPA 8270 (R) -F.1	09/02	09/24	MT
bis(2-Chloroethyl)ether	0.010	U	mg/L	EPA 8270 (J)	09/02	09/24	MT
2-Chlorophenol	0.010	U	mg/L	EPA 8270 (R)	09/02	09/24	MT
1,3-Dichlorobenzene	0.010	U	mg/L	EPA 8270 (J)	09/02	09/24	MT
1,4-Dichlorobenzene	0.010	U	mg/L	EPA 8270 (J)	09/02	09/24	MT
Benzyl Alcohol	0.010	U	mg/L	EPA 8270 (J)	09/02	09/24	MT
1,2-Dichlorobenzene	0.010	U	mg/L	EPA 8270 (J)	09/02	09/24	MT
2-Methylphenol	0.010	U	mg/L	EPA 8270 (R)	09/02	09/24	MT
bis(2-Chloroisopropyl)e	0.010	U	mg/L	EPA 8270 (J)	09/02	09/24	MT
4-Methylphenol	0.010	U	mg/L	EPA 8270 (R)	09/02	09/24	MT
n-Nitroso-di-n-Propylam	0.010	U	mg/L	EPA 8270 (J)	09/02	09/24	MT
Hexachloroethane	0.010	U	mg/L	EPA 8270 (J)	09/02	09/24	MT
Nitrobenzene	0.010	U	mg/L	EPA 8270 (J)	09/02	09/24	MT
Isophorone	0.010	U	mg/L	EPA 8270 (J)	09/02	09/24	MT
2-Nitrophenol	0.010	U	mg/L	EPA 8270 (R)	09/02	09/24	MT
2,4-Dimethylphenol	0.010	U	mg/L	EPA 8270 (R)	09/02	09/24	MT
Benzoic Acid	0.010	U	mg/L	EPA 8270 (R)	09/02	09/24	MT
bis(2-Chloroethoxy)Meth	0.010	U	mg/L	EPA 8270 (J)	09/02	09/24	MT
2,4-Dichlorophenol	0.010	U	mg/L	EPA 8270 (R)	09/02	09/24	MT
1,2,4-Trichlorobenzene	0.010	U	mg/L	EPA 8270 (J)	09/02	09/24	MT
Naphthalene	0.010	U	mg/L	EPA 8270	09/02	09/24	MT
4-Chloroaniline	0.010	U	mg/L	EPA 8270	09/02	09/24	MT
Hexachlorobutadiene	0.010	U	mg/L	EPA 8270	09/02	09/24	MT
4-Chloro-3-Methylphenol	0.010	U	mg/L	EPA 8270 (R)	09/02	09/24	MT
2-Methylnaphthalene	0.010	U	mg/L	EPA 8270 (J)	09/02	09/2	MT
Hexachlorocyclopentadie	0.010	U	mg/L	EPA 8270 (J)	09/02	09/2	MT
2,4,6-Trichlorophenol	0.010	U	mg/L	EPA 8270 (R)	09/02	09/24	MT
2,4,5-Trichlorophenol	0.010	U	mg/L	EPA 8270 (R)	09/02	09/24	MT

2-18-94

COMMERCIAL TESTING & ENGINEERING CO.

ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

5633 B STREE
ANCHORAGE, AK 995
TEL: (907) 562-234
FAX: (907) 561-530

Chemlab Ref.# :93.4395-3
Client Sample ID :BRW-BKGD-SW01 BARROW
Matrix :WATER

Qualifier/Comments

2-Chloronaphthalene	0.010	U	mg/L	EPA 8270	(J) - F	09/02	09/24	M
2-Nitroaniline	0.010	U	mg/L	EPA 8270		09/02	09/24	M
Dimethylphthalate	0.010	U	mg/L	EPA 8270		09/02	09/24	M
Acenaphthylene	0.010	U	mg/L	EPA 8270		09/02	09/24	M
2,6-Dinitrotoluene	0.010	U	mg/L	EPA 8270		09/02	09/24	M
3-Nitroaniline	0.010	U	mg/L	EPA 8270		09/02	09/24	M
Acenaphthene	0.010	U	mg/L	EPA 8270		09/02	09/24	M
2,4-Dinitrophenol	0.010	U	mg/L	EPA 8270	(R)	09/02	09/24	M
4-Nitrophenol	0.010	U	mg/L	EPA 8270	(R)	09/02	09/24	M
Dibenzofuran	0.010	U	mg/L	EPA 8270	(J)	09/02	09/24	M
2,4-Dinitrotoluene	0.010	U	mg/L	EPA 8270		09/02	09/24	M
Diethylphthalate	0.010	U	mg/L	EPA 8270		09/02	09/24	M
4-Chlorophenyl-Phenylet	0.010	U	mg/L	EPA 8270		09/02	09/24	M
Fluorene	0.010	U	mg/L	EPA 8270		09/02	09/24	M
4-Nitroaniline	0.010	U	mg/L	EPA 8270		09/02	09/24	M
4,6-Dinitro-2-Methylphe	0.010	U	mg/L	EPA 8270		09/02	09/24	M
n-Nitrosodiphenylamine	0.010	U	mg/L	EPA 8270		09/02	09/24	M
4-Bromophenyl-Phenyleth	0.010	U	mg/L	EPA 8270		09/02	09/24	M
Hexachlorobenzene	0.010	U	mg/L	EPA 8270		09/02	09/24	MT
Pentachlorophenol	0.010	U	mg/L	EPA 8270	(R)	09/02	09/24	MT
Phenanthrene	0.010	U	mg/L	EPA 8270	(J)	09/02	09/24	MT
Anthracene	0.010	U	mg/L	EPA 8270		09/02	09/24	MT
di-n-Butylphthalate	0.010	U	mg/L	EPA 8270		09/02	09/24	MT
Fluoranthene	0.010	U	mg/L	EPA 8270		09/02	09/24	MT
Pyrene	0.010	U	mg/L	EPA 8270		09/02	09/24	MT
Butylbenzylphthalate	0.010	U	mg/L	EPA 8270		09/02	09/24	MT
3,3-Dichlorobenzidine	0.010	U	mg/L	EPA 8270		09/02	09/24	MT
Benzo(a)Anthracene	0.010	U	mg/L	EPA 8270		09/02	09/24	MT
Chrysene	0.010	U	mg/L	EPA 8270		09/02	09/24	MT
bis(2-Ethylhexyl)Phthal	0.010	U	mg/L	EPA 8270		09/02	09/24	MT
di-n-Octylphthalate	0.010	U	mg/L	EPA 8270		09/02	09/24	MT
Benzo(b)Fluoranthene	0.010	U	mg/L	EPA 8270		09/02	09/24	MT
Benzo(k)Fluoranthene	0.010	U	mg/L	EPA 8270		09/02	09/24	MT
Benzo(a)Pyrene	0.010	U	mg/L	EPA 8270		09/02	09/24	MT
Indeno(1,2,3-cd)Pyrene	0.010	U	mg/L	EPA 8270		09/02	09/24	MT
Dibenz(a,h)Anthracene	0.010	U	mg/L	EPA 8270		09/02	09/24	MT
Benzo(g,h,i)Perylene	0.010	U	mg/L	EPA 8270		09/02	09/24	MT
Total Metals Analysis	---							
ICP Screen, ICF				EPA	n/a			
Aluminum	0.10	U	mg/L	EPA 6010		09/06	09/10	DL
Antimony	0.10	U	mg/L	EPA 6010		09/06	09/10	DL
Arsenic	0.10	U	mg/L	EPA 6010		09/06	09/10	DL
Barium	0.050	U	mg/L	EPA 6010		09/06	09/10	DL
Beryllium	0.050	U	mg/L	EPA 6010		09/06	09/10	DL
Cadmium	0.050	U	mg/L	EPA 6010		09/06	09/10	DL
Calcium	8.0		mg/L	EPA 6010		09/06	09/10	DL
Chromium	0.050	U	mg/L	EPA 6010		09/06	09/10	DL
Cobalt	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Copper	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Iron	0.18		mg/L	EPA 6010		09/06	09/10	DLG

2-18-94

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 9951[illegible]
TEL: (907) 562-234[illegible]
FAX: (907) 561-530[illegible]

Chemlab Ref.# :93.4395-3
Client Sample ID :BRW-BKGD-SW01 BARROW
Matrix :WATER

		Qualifier	Conversion					
Lead	0.10	U	mg/L	EPA 6010		09/06	09/10	DL
Magnesium	10		mg/L	EPA 6010		09/06	09/10	DL
Manganese	0.050	U	mg/L	EPA 6010		09/06	09/10	DL
Molybdenum	0.050	U	mg/L	EPA 6010		09/06	09/10	DL
Nickel	0.050	U	mg/L	EPA 6010		09/06	09/10	DL
Potassium	5.0	U	mg/L	EPA 6010		09/06	09/10	DL
Selenium	0.10	U	mg/L	EPA 6010		09/06	09/10	DL
Silver	0.050	U	mg/L	EPA 6010		09/06	09/10	DL
Sodium	39		mg/L	EPA 6010		09/06	09/10	DL
Thallium	0.005	U	mg/L	EPA 7841		09/06	09/08	BM
Vanadium	0.050	U	mg/L	EPA 6010		09/06	09/10	DL
Zinc	0.050	U	mg/L	EPA 6010		09/06	09/10	DL
Dissolved Metals Analys	---			-				
ICP Screen, ICF				EPA	n/a			
Aluminum	0.10	U	mg/L	EPA 6010		09/06	09/10	DL
Antimony	0.10	U	mg/L	EPA 6010		09/06	09/10	DL
Arsenic	0.10	U	mg/L	EPA 6010		09/06	09/10	DL
Barium	0.050	U	mg/L	EPA 6010		09/06	09/10	DL
Beryllium	0.050	U	mg/L	EPA 6010		09/06	09/10	DL
Cadmium	0.050	U	mg/L	EPA 6010		09/06	09/10	DL
Calcium	8.5		mg/L	EPA 6010		09/06	09/10	[illegible]
Chromium	0.050	U	mg/L	EPA 6010		09/06	09/10	DL
Cobalt	0.10	U	mg/L	EPA 6010		09/06	09/10	DL
Copper	0.050	U	mg/L	EPA 6010		09/06	09/10	DL
Iron	0.15		mg/L	EPA 6010		09/06	09/10	DL
Lead	0.10	U	mg/L	EPA 6010		09/06	09/10	DL
Magnesium	10		mg/L	EPA 6010		09/06	09/10	DL
Manganese	0.050	U	mg/L	EPA 6010		09/06	09/10	DL
Molybdenum	0.050	U	mg/L	EPA 6010		09/06	09/10	DL
Nickel	0.050	U	mg/L	EPA 6010		09/06	09/10	DL
Potassium	5.0	U	mg/L	EPA 6010		09/06	09/10	DL
Selenium	0.10	U	mg/L	EPA 6010		09/06	09/10	DL
Silver	0.050	U	mg/L	EPA 6010		09/06	09/10	DL
Sodium	39	J	mg/L J.1	EPA 6010		09/06	09/10	DL
Thallium	0.005	U	mg/L	EPA 7841		09/06	09/08	BM
Vanadium	0.050	U	mg/L	EPA 6010		09/06	09/10	DL
Zinc	0.050	U	mg/L	EPA 6010		09/06	09/10	DL
TOC, Nonpurgable				EPA 9060	n/a			
...TOC Range	15.5-18.1		mg/L	EPA 9060			09/08	CM
...TOC Concentration	16.7		mg/L	EPA 9060			09/08	CM
Residue, Non-Filterable	5		mg/L	EPA 160.2		09/02	09/02	GP
Residue,Filterable(TDS)	166	J	mg/L A.1	EPA 160.1	500	09/03	09/07	RJ

2/17/94 Compiled GML

All chgs S.L 2/18/94

11-30-94

* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

REPORT of ANALYSIS

Emlab Ref.# :93.4395-5
Client Sample ID :BRW-BKGD-SW01 BARROW DUPLICATE
Matrix :WATER

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70159
Report Completed :09/29/93
Collected :08/26/93 @ 13:50 hrs.
Received :08/28/93 @ 09:30 hrs.
Technical Director:STEPHEN C. EDE
Released By :

Sample Remarks: SAMPLE COLLECTED BY: D. NOE, JEFF J. DAWSON, AND S.S. SEPPOVEN.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Total Metals Analysis	---			-				
ICP Screen, ICF				EPA	n/a			
Aluminum	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Antimony	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Arsenic	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Barium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Beryllium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Cadmium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Calcium	8.3		mg/L	EPA 6010		09/06	09/10	DLG
Chromium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Cobalt	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Copper	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Iron	0.21		mg/L	EPA 6010		09/06	09/10	DLG
Lead	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Magnesium	10		mg/L	EPA 6010		09/06	09/10	DLG
Manganese	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Molybdenum	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Nickel	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Potassium	5.0	U	mg/L	EPA 6010		09/06	09/10	DLG
Selenium	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Silver	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Sodium	38		mg/L	EPA 6010		09/06	09/10	DLG
Thallium	0.005	U	mg/L	EPA 7841		09/06	09/08	BMW
Vanadium	0.050	U	mg/L	EPA 6010		09/06	09/10	DFL
Zinc	0.050	U	mg/L	EPA 6010		09/06	09/10	DFL
Dissolved Metals Analys	---			-				
ICP Screen, ICF				EPA	n/a			
Aluminum	0.10	U	mg/L	EPA 6010		09/06	09/10	DFL
Antimony	0.10	U	mg/L	EPA 6010		09/06	09/10	DFL
Arsenic	0.10	U	mg/L	EPA 6010		09/06	09/10	DFL
Barium	0.050	U	mg/L	EPA 6010		09/06	09/10	DFL
Beryllium	0.050	U	mg/L	EPA 6010		09/06	09/10	DFL
Cadmium	0.050	U	mg/L	EPA 6010		09/06	09/10	DFL
Calcium	8.4		mg/L	EPA 6010		09/06	09/10	DFL
Chromium	0.050	U	mg/L	EPA 6010		09/06	09/10	DFL
Cobalt	0.10	U	mg/L	EPA 6010		09/06	09/10	DFL
Copper	0.050	U	mg/L	EPA 6010		09/06	09/10	DFL

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES
SINCE 1908

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

REPORT of ANALYSIS

Chemlab Ref.# :93.4395-5
Client Sample ID :BRW-BKGD-SW01 BARROW DUPLICATE
Matrix :WATER

Iron	0.15		mg/L	EPA 6010	09/06	09/10	DFL
Lead	0.10	U	mg/L	EPA 6010	09/06	09/10	DFL
Magnesium	10		mg/L	EPA 6010	09/06	09/10	DFL
Manganese	0.050	U	mg/L	EPA 6010	09/06	09/10	DFL
Molybdenum	0.050	U	mg/L	EPA 6010	09/06	09/10	DFL
Nickel	0.050	U	mg/L	EPA 6010	09/06	09/10	DFL
Potassium	5.0	U	mg/L	EPA 6010	09/06	09/10	DFL
Selenium	0.10	U	mg/L	EPA 6010	09/06	09/10	DFL
Silver	0.050	U	mg/L	EPA 6010	09/06	09/10	DFL
Sodium	37		mg/L	EPA 6010	09/06	09/10	DFL
Thallium	0.005	U	mg/L	EPA 7841	09/06	09/08	BMW
Vanadium	0.050	U	mg/L	EPA 6010	09/06	09/10	DLG
Zinc	0.050		mg/L	EPA 6010	09/06	09/10	DLG

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* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE AK 99518
TEL (907) 562-2343
FAX (907) 561-5301

Chemlab Ref.# :93.4395-4
Client Sample ID :BRW-BKGD-SW01 BARROW SPIKE
Matrix :WATER

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70159
Report Completed :09/29/93
Collected :08/26/93 @ 13:50 hrs.
Received :08/28/93 @ 09:30 hrs.
Technical Director:STEPHEN C. EDE
Released By :

Sample Remarks: SAMPLE COLLECTED BY: D. NOE, JEFF J. DAWSON, AND S.S. SEPPOVEN.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Total Metals Analysis	---			-				
ICP Screen, ICF				EPA	n/a			
Aluminum	1.03		mg/L	EPA 6010		09/06	09/10	DLG
Antimony	0.90		mg/L	EPA 6010		09/06	09/10	DLG
Arsenic	0.95		mg/L	EPA 6010		09/06	09/10	DLG
Barium	1.01		mg/L	EPA 6010		09/06	09/10	DLG
Beryllium	0.39		mg/L	EPA 6010		09/06	09/10	DLG
Cadmium	0.49		mg/L	EPA 6010		09/06	09/10	DLG
Calcium	18		mg/L	EPA 6010		09/06	09/10	DLG
Chromium	0.99		mg/L	EPA 6010		09/06	09/10	DLG
Cobalt	0.99		mg/L	EPA 6010		09/06	09/10	DLG
Copper	1.00		mg/L	EPA 6010		09/06	09/10	DLG
Iron	1.20		mg/L	EPA 6010		09/06	09/10	DLG
Lead	0.97		mg/L	EPA 6010		09/06	09/10	DLG
Magnesium	20		mg/L	EPA 6010		09/06	09/10	DLG
Manganese	1.02		mg/L	EPA 6010		09/06	09/10	DLG
Molybdenum	1.03		mg/L	EPA 6010		09/06	09/10	DLG
Nickel	0.99		mg/L	EPA 6010		09/06	09/10	DLG
Potassium	9.0		mg/L	EPA 6010		09/06	09/10	DLG
Selenium	0.88		mg/L	EPA 6010		09/06	09/10	DLG
Silver	0.17		mg/L	EPA 6010		09/06	09/10	DLG
Sodium	49		mg/L	EPA 6010		09/06	09/10	DLG
Thallium	0.017		mg/L	EPA 7841		09/06	09/08	BMW
Vanadium	0.96		mg/L	EPA 6010		09/06	09/10	DLG
Zinc	5.7		mg/L	EPA 6010		09/06	09/10	DLG
Dissolved Metals Analys	---			-				
ICP Screen, ICF				EPA	n/a			
Aluminum	0.96		mg/L	EPA 6010		09/06	09/10	DLG
Antimony	0.89		mg/L	EPA 6010		09/06	09/10	DLG
Arsenic	0.95		mg/L	EPA 6010		09/06	09/10	DLG
Barium	1.00		mg/L	EPA 6010		09/06	09/10	DLG
Beryllium	0.38		mg/L	EPA 6010		09/06	09/10	DLG
Cadmium	0.51		mg/L	EPA 6010		09/06	09/10	DLG
Calcium	18		mg/L	EPA 6010		09/06	09/10	DLG
Chromium	1.00		mg/L	EPA 6010		09/06	09/10	DLG
Cobalt	1.00		mg/L	EPA 6010		09/06	09/10	DLG
Copper	0.97		mg/L	EPA 6010		09/06	09/10	DLG

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE AK 99518
TEL. (907) 562-2343
FAX (907) 561-5301

Chemlab Ref.# :93.4395-4
Client Sample ID :BRW-BKGD-SW01 BARROW SPIKE
Matrix :WATER

Iron	1.14	mg/L	EPA 6010	09/06	09/10	DLG
Lead	0.98	mg/L	EPA 6010	09/06	09/10	DLG
Magnesium	19	mg/L	EPA 6010	09/06	09/10	DLG
Manganese	1.03	mg/L	EPA 6010	09/06	09/10	DLG
Molybdenum	1.00	mg/L	EPA 6010	09/06	09/10	DLG
Nickel	1.00	mg/L	EPA 6010	09/06	09/10	DLG
Potassium	8.1	mg/L	EPA 6010	09/06	09/10	DLG
Selenium	0.89	mg/L	EPA 6010	09/06	09/10	DLG
Silver	0.17	mg/L	EPA 6010	09/06	09/10	DLG
Sodium	45	mg/L	EPA 6010	09/06	09/10	DLG
Thallium	0.016	mg/L	EPA 7841	09/06	09/08	BMW
Vanadium	0.96	mg/L	EPA 6010	09/06	09/10	DLG
Zinc	0.97	mg/L	EPA 6010	09/06	09/10	DLG

* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

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NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4395-6
Client Sample ID :BRW-BKGD-SW02 BARROW
Matrix :WATER

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70159
Report Completed :09/29/93
Collected :08/26/93 @ 11:20 hrs.
Received :08/28/93 @ 09:30 hrs.
Technical Director:STEPHEN C. EDE
Released By : Steph C. Ede

Sample Remarks: SAMPLE COLLECTED BY: D. NOE, JEFF J. DAWSON, AND S.S. SEPPOVEN.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Volatile Organics				EPA 8260				
Benzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Bromobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Bromochloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Bromodichloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Bromoform	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Bromomethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
n-Butylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
sec-Butylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
tert-Butylbenzne	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Carbon Tetrachloride	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Chlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Chloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Chloroform	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Chloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
2-Chlorotoluene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
4-Chlorotoluene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Dibromochloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
12Dibromo3Chloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,2-Dibromoethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Dibromomethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,2-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,3-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,4-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Dichlorodifluoromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,1-Dichloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,2-Dichloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,1-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
cis-1,2-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
trans1,2-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,2-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,3-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
2,2-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,1-Dichloropropene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Ethylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Hexachlorobutadiene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Isopropylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
p-Isopropyltoluene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES
SINCE 1908

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4395-6
Client Sample ID :BRW-BKGD-SW02 BARROW
Matrix :WATER

Methylene Chloride	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
Napthalene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
n-Propylbenzene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
Styrene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1112-Tetrachloroethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1122-Tetrachloroethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
Tetrachloroethene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
Toluene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1,2,3-Trichlorobenzene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1,2,4-Trichlorobenzene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1,1,1-Trichloroethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1,1,2-Trichloroethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
Trichloroethene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
Trichlorofluoromethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1,2,3-Trichloropropane	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1,2,4-Trimethylbenzene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1,3,5-Trimethylbenzene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
Vinyl Chloride	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
p+m-Xylene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
o-Xylene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM

*   See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.

ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4394-1
Client Sample ID :BRW-BKGD-SW02 BARROW
Matrix :WATER

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS
Project# :41096-412-01
PWSID :UA

WORK Order :70157
Report Completed :09/28/93
Collected :08/26/93 @ 11:20 hrs
Received :08/28/93 @ 09:35 hrs
Technical Director:STEPHEN C. EDE
Released By :

Sample Remarks: SAMPLE COLLECTED BY: D. NOE AND S.S. SEPPOVEN.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Semivolatile Organics				EPA 8270				
Phenol	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
bis(2-Chloroethyl)ether	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
2-Chlorophenol	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
1,3-Dichlorobenzene	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
1,4-Dichlorobenzene	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
Benzyl Alcohol	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
1,2-Dichlorobenzene	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
2-Methylphenol	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
bis(2-Chloroisopropyl)e	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
4-Methylphenol	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
n-Nitroso-di-n-Propylam	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
Hexachloroethane	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
Nitrobenzene	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
Isophorone	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
2-Nitrophenol	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
2,4-Dimethylphenol	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
Benzoic Acid	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
bis(2-Chloroethoxy)Meth	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
2,4-Dichlorophenol	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
1,2,4-Trichlorobenzene	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
Naphthalene	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
4-Chloroaniline	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
Hexachlorobutadiene	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
4-Chloro-3-Methylphenol	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
2-Methylnaphthalene	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
Hexachlorocyclopentadie	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
2,4,6-Trichlorophenol	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
2,4,5-Trichlorophenol	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
2-Chloronaphthalene	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
2-Nitroaniline	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
Dimethylphthalate	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
Acenaphthylene	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
2,6-Dinitrotoluene	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
3-Nitroaniline	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
Acenaphthene	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
2,4-Dinitrophenol	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
4-Nitrophenol	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT

COMMERCIAL TESTING & ENGINEERING CO.

ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4394-1
Client Sample ID :BRW-BKGD-SW02 BARROW
Matrix :WATER

Dibenzofuran	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
2,4-Dinitrotoluene	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
Diethylphthalate	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
4-Chlorophenyl-Phenylet	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
Fluorene	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
4-Nitroaniline	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
4,6-Dinitro-2-Methylphe	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
n-Nitrosodiphenylamine	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
4-Bromophenyl-Phenyleth	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
Hexachlorobenzene	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
Pentachlorophenol	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
Phenanthrene	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
Anthracene	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
di-n-Butylphthalate	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
Fluoranthene	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
Pyrene	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
Butylbenzylphthalate	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
3,3-Dichlorobenzidine	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
Benzo(a)Anthracene	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
Chrysene	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
bis(2-Ethylhexyl)Phthal	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
di-n-Octylphthalate	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
Benzo(b)Fluoranthene	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
Benzo(k)Fluoranthene	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
Benzo(a)Pyrene	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
Indeno(1,2,3-cd)Pyrene	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
Dibenz(a,h)Anthracene	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
Benzo(g,h,i)Perylene	0.025	U	mg/L	EPA 8270		09/02	09/24	MTT
Total Metals Analysis	---			-				
ICP Screen, ICF				EPA	n/a			
Aluminum	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Antimony	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Arsenic	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Barium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Beryllium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Cadmium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Calcium	13		mg/L	EPA 6010		09/06	09/10	DLG
Chromium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Cobalt	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Copper	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Iron	0.25		mg/L	EPA 6010		09/06	09/10	DLG
Lead	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Magnesium	14		mg/L	EPA 6010		09/06	09/10	DLG
Manganese	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Molybdenum	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Nickel	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Potassium	5.0	U	mg/L	EPA 6010		09/06	09/10	DLG
Selenium	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Silver	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Sodium	49		mg/L	EPA 6010		09/06	09/10	DLG

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

Chemlab Ref.# :93.4394-1
Client Sample ID :BRW-BKGD-SW02 BARROW
Matrix :WATER

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Thallium	0.005	U	mg/L	EPA 7841		09/06 09/08	BMW
Vanadium	0.050	U	mg/L	EPA 6010		09/06 09/10	DLC
Zinc	0.073		mg/L	EPA 6010		09/06 09/10	DLC
Dissolved Metals Analys	---			-			
ICP Screen, ICF				EPA	n/a		
Aluminum	0.10	U	mg/L	EPA 6010		09/06 09/10	DLC
Antimony	0.10	U	mg/L	EPA 6010		09/06 09/10	DLC
Arsenic	0.10	U	mg/L	EPA 6010		09/06 09/10	DLG
Barium	0.050	U	mg/L	EPA 6010		09/06 09/10	DLG
Beryllium	0.050	U	mg/L	EPA 6010		09/06 09/10	DLG
Cadmium	0.050	U	mg/L	EPA 6010		09/06 09/10	DLG
Calcium	14		mg/L	EPA 6010		09/06 09/10	DLG
Chromium	0.050	U	mg/L	EPA 6010		09/06 09/10	DLG
Cobalt	0.10	U	mg/L	EPA 6010		09/06 09/10	DLG
Copper	0.050	U	mg/L	EPA 6010		09/06 09/10	DLG
Iron	0.36		mg/L	EPA 6010		09/06 09/10	DLG
Lead	0.10	U	mg/L	EPA 6010		09/06 09/10	DLG
Magnesium	14		mg/L	EPA 6010		09/06 09/10	DLG
Manganese	0.050	U	mg/L	EPA 6010		09/06 09/10	DLG
Molybdenum	0.050	U	mg/L	EPA 6010		09/06 09/10	DLG
Nickel	0.050	U	mg/L	EPA 6010		09/06 09/10	DLG
Potassium	5.0	U	mg/L	EPA 6010		09/06 09/10	DLG
Selenium	0.10	U	mg/L	EPA 6010		09/06 09/10	DLG
Silver	0.050	U	mg/L	EPA 6010		09/06 09/10	DLG
Sodium	46		mg/L	EPA 6010		09/06 09/10	DLG
Thallium	0.005	U	mg/L	EPA 7841		09/06 09/08	BMW
Vanadium	0.050	U	mg/L	EPA 6010		09/06 09/10	DLG
Zinc	0.050	U	mg/L	EPA 6010		09/06 09/10	DLG
TOC, Nonpurgable				EPA 9060	n/a		
...TOC Range	21.8-23.5		mg/L	EPA 9060		09/08	CMR
...TOC Concentration	22.5		mg/L	EPA 9060		09/08	CMR
Residue, Non-Filterable	6		mg/L	EPA 160.2		09/02 09/02	GPF
Residue,Filterable(TDS)	213		mg/L	EPA 160.1	500	09/03 09/07	RJK

* See Special Instructions Above
See Sample Remarks Above
= Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4394-2
Client Sample ID :BRW-BKGD-SW02 BARROW DUPLICATE
Matrix :WATER

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS
Project# :41096-412-01
PWSID :UA

WORK Order :70157
Report Completed :09/28/93
Collected :08/26/93 @ 11:20 hrs
Received :08/28/93 @ 09:35 hrs
Technical Director:STEPHEN C. EDE
Released By :

Sample Remarks: SAMPLE COLLECTED BY: D. NOE AND S.S. SEPPOVEN.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Total Metals Analysis	---			-				
ICP Screen, ICF				EPA	n/a			
Aluminum	0.10		mg/L	EPA 6010		09/06	09/10	DLG
Antimony	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Arsenic	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Barium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Beryllium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Cadmium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Calcium	13		mg/L	EPA 6010		09/06	09/10	DLG
Chromium	0.050	U	mg/L	EPA 6010		09/06	09/10	[illegible]G
Cobalt	0.10	U	mg/L	EPA 6010		09/06	09/10	[illegible]G
Copper	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Iron	0.28		mg/L	EPA 6010		09/06	09/10	DLG
Lead	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Magnesium	14		mg/L	EPA 6010		09/06	09/10	DLG
Manganese	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Molybdenum	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Nickel	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Potassium	5.0	U	mg/L	EPA 6010		09/06	09/10	DLG
Selenium	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Silver	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Sodium	50		mg/L	EPA 6010		09/06	09/10	DLG
Thallium	0.0050	U	mg/L	EPA 7841		09/06	09/08	BMW
Vanadium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Zinc	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Dissolved Metals Analys	---			-				
ICP Screen, ICF				EPA	n/a			
Aluminum	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Antimony	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Arsenic	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Barium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Beryllium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Cadmium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Calcium	14		mg/L	EPA 6010		09/06	09/10	DLG
Chromium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLG
Cobalt	0.10	U	mg/L	EPA 6010		09/06	09/10	DLG
Copper	0.050	U	mg/L	EPA 6010		09/06	09/10	[illegible]G

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

Chemlab Ref.# :93.4394-2
Client Sample ID :BRW-BKGD-SW02 BARROW DUPLICATE
Matrix :WATER

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Iron	0.37		mg/L	EPA 6010		09/06	09/10	DLC
Lead	0.10	U	mg/L	EPA 6010		09/06	09/10	DLC
Magnesium	15		mg/L	EPA 6010		09/06	09/10	DLC
Manganese	0.050	U	mg/L	EPA 6010		09/06	09/10	DLC
Molybdenum	0.050	U	mg/L	EPA 6010		09/06	09/10	DLC
Nickel	0.050	U	mg/L	EPA 6010		09/06	09/10	DLC
Potassium	5.0	U	mg/L	EPA 6010		09/06	09/10	DLC
Selenium	0.10	U	mg/L	EPA 6010		09/06	09/10	DLC
Silver	0.050	U	mg/L	EPA 6010		09/06	09/10	DLC
Sodium	47		mg/L	EPA 6010		09/06	09/10	DLC
Thallium	0.0050	U	mg/L	EPA 7841		09/06	09/08	BMV
Vanadium	0.050	U	mg/L	EPA 6010		09/06	09/10	DLC
Zinc	0.050	U	mg/L	EPA 6010		09/06	09/10	DLC
TOC, Nonpurgable				EPA 9060	n/a			
...TOC Range	21.7-22.4		mg/L	EPA 9060			09/08	CMF
...TOC Concentration	22.0		mg/L	EPA 9060		09/06	09/08	CMF

* See Special Instructions Above
See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4394-3
Client Sample ID :BRW-BKGD-SW02 BARROW SPIKE
Matrix :WATER

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS
Project# :41096-412-01
PWSID :UA

WORK Order :70157
Report Completed :09/28/93
Collected :08/26/93 @ 11:20 hrs
Received :08/28/93 @ 09:35 hrs
Technical Director:STEPHEN C. EDE
Released By :

Sample Remarks: SAMPLE COLLECTED BY: D. NOE AND S.S. SEPPOVEN. J = INDICATES AN ANALYTE WHOSE CONCENTRATION IS ESTIMATED BECAUSE THE ANALYTE'S CONCENTRATION IS DETECTED BELOW THE CALIBRATION RANGE. FOR SPIKE RECOVERIES, SEE QC SUMMARY.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Semivolatile Organics				EPA 8270				
Phenol	0.062		mg/L	EPA 8270		09/02	09/24	MTI
bis(2-Chloroethyl)ether	0.033	U	mg/L	EPA 8270		09/02	09/24	MTI
2-Chlorophenol	0.084		mg/L	EPA 8270		09/02	09/24	MTI
1,3-Dichlorobenzene	0.033	U	mg/L	EPA 8270		09/02	09/24	MTI
1,4-Dichlorobenzene	0.134		mg/L	EPA 8270		09/02	09/24	MTI
Benzyl Alcohol	0.033	U	mg/L	EPA 8270		09/02	09/24	MTI
1,2-Dichlorobenzene	0.033	U	mg/L	EPA 8270		09/02	09/24	MTI
2-Methylphenol	0.033	U	mg/L	EPA 8270		09/02	09/24	MTI
bis(2-Chloroisopropyl)e	0.033	U	mg/L	EPA 8270		09/02	09/24	MTI
4-Methylphenol	0.033	U	mg/L	EPA 8270		09/02	09/24	MTI
n-Nitroso-di-n-Propylam	0.196		mg/L	EPA 8270		09/02	09/24	MTI
Hexachloroethane	0.033	U	mg/L	EPA 8270		09/02	09/24	MTI
Nitrobenzene	0.033	U	mg/L	EPA 8270		09/02	09/24	MTI
Isophorone	0.033	U	mg/L	EPA 8270		09/02	09/24	MTI
2-Nitrophenol	0.033	U	mg/L	EPA 8270		09/02	09/24	MTI
2,4-Dimethylphenol	0.033	U	mg/L	EPA 8270		09/02	09/24	MTI
Benzoic Acid	0.033	U	mg/L	EPA 8270		09/02	09/24	MTI
bis(2-Chloroethoxy)Meth	0.033	U	mg/L	EPA 8270		09/02	09/24	MTI
2,4-Dichlorophenol	0.033	U	mg/L	EPA 8270		09/02	09/24	MTI
1,2,4-Trichlorobenzene	0.149		mg/L	EPA 8270		09/02	09/24	MTI
Naphthalene	0.033	U	mg/L	EPA 8270		09/02	09/24	MTI
4-Chloroaniline	0.033	U	mg/L	EPA 8270		09/02	09/24	MTI
Hexachlorobutadiene	0.033	U	mg/L	EPA 8270		09/02	09/24	MTI
4-Chloro-3-Methylphenol	0.111		mg/L	EPA 8270		09/02	09/24	MTI
2-Methylnaphthalene	0.033	U	mg/L	EPA 8270		09/02	09/24	MTI
Hexachlorocyclopentadie	0.033	U	mg/L	EPA 8270		09/02	09/24	MTI
2,4,6-Trichlorophenol	0.033	U	mg/L	EPA 8270		09/02	09/24	MTI
2,4,5-Trichlorophenol	0.033	U	mg/L	EPA 8270		09/02	09/24	MTI
2-Chloronaphthalene	0.033	U	mg/L	EPA 8270		09/02	09/24	MTI
2-Nitroaniline	0.033	U	mg/L	EPA 8270		09/02	09/24	MTI
Dimethylphthalate	0.033	U	mg/L	EPA 8270		09/02	09/24	MTI
Acenaphthylene	0.033	U	mg/L	EPA 8270		09/02	09/24	MTI
2,6-Dinitrotoluene	0.033	U	mg/L	EPA 8270		09/02	09/24	MTI
3-Nitroaniline	0.033	U	mg/L	EPA 8270		09/02	09/24	MTI

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

Chemlab Ref.# :93.4394-3
Client Sample ID :BRW-BKGD-SW02 BARROW SPIKE
Matrix :WATER

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Acenaphthene	0.166		mg/L	EPA 8270		09/02	09/24	MTT
2,4-Dinitrophenol	0.033	U	mg/L	EPA 8270		09/02	09/24	MTT
4-Nitrophenol	0.015	J	mg/L	EPA 8270		09/02	09/24	MTT
Dibenzofuran	0.033	U	mg/L	EPA 8270		09/02	09/24	MTT
2,4-Dinitrotoluene	0.187		mg/L	EPA 8270		09/02	09/24	MTT
Diethylphthalate	0.033	U	mg/L	EPA 8270		09/02	09/24	MTT
4-Chlorophenyl-Phenylet	0.033	U	mg/L	EPA 8270		09/02	09/24	MTT
Fluorene	0.033	U	mg/L	EPA 8270		09/02	09/24	MTT
4-Nitroaniline	0.033	U	mg/L	EPA 8270		09/02	09/24	MTT
4,6-Dinitro-2-Methylphe	0.033	U	mg/L	EPA 8270		09/02	09/24	MTT
n-Nitrosodiphenylamine	0.033	U	mg/L	EPA 8270		09/02	09/24	MTT
4-Bromophenyl-Phenyleth	0.033	U	mg/L	EPA 8270		09/02	09/24	MTT
Hexachlorobenzene	0.033	U	mg/L	EPA 8270		09/02	09/24	MTT
Pentachlorophenol	0.0027	J	mg/L	EPA 8270		09/02	09/24	MTT
Phenanthrene	0.033	U	mg/L	EPA 8270		09/02	09/24	MTT
Anthracene	0.033	U	mg/L	EPA 8270		09/02	09/24	MTT
di-n-Butylphthalate	0.064		mg/L	EPA 8270		09/02	09/24	MTT
Fluoranthene	0.033	U	mg/L	EPA 8270		09/02	09/24	MTT
Pyrene	0.189		mg/L	EPA 8270		09/02	09/24	MTT
Butylbenzylphthalate	0.033	U	mg/L	EPA 8270		09/02	09/24	MTT
3,3-Dichlorobenzidine	0.033	U	mg/L	EPA 8270		09/02	09/24	MTT
Benzo(a)Anthracene	0.033	U	mg/L	EPA 8270		09/02	09/24	MTT
Chrysene	0.033	U	mg/L	EPA 8270		09/02	09/24	MTT
bis(2-Ethylhexyl)Phthal	0.033	U	mg/L	EPA 8270		09/02	09/24	MTT
di-n-Octylphthalate	0.033	U	mg/L	EPA 8270		09/02	09/24	MTT
Benzo(b)Fluoranthene	0.033	U	mg/L	EPA 8270		09/02	09/24	MTT
Benzo(k)Fluoranthene	0.033	U	mg/L	EPA 8270		09/02	09/24	MTT
Benzo(a)Pyrene	0.033	U	mg/L	EPA 8270		09/02	09/24	MTT
Indeno(1,2,3-cd)Pyrene	0.033	U	mg/L	EPA 8270		09/02	09/24	MTT
Dibenz(a,h)Anthracene	0.033	U	mg/L	EPA 8270		09/02	09/24	MTT
Benzo(g,h,i)Perylene	0.033	U	mg/L	EPA 8270		09/02	09/24	MTT
Total Metals Analysis	---			-				
ICP Screen, ICF				EPA	n/a			
Aluminum	1.02		mg/L	EPA 6010		09/06	09/10	DLG
Antimony	0.87		mg/L	EPA 6010		09/06	09/10	DLG
Arsenic	0.92		mg/L	EPA 6010		09/06	09/10	DLG
Barium	1.01		mg/L	EPA 6010		09/06	09/10	DLG
Beryllium	0.38		mg/L	EPA 6010		09/06	09/10	DLG
Cadmium	0.48		mg/L	EPA 6010		09/06	09/10	DLG
Calcium	23		mg/L	EPA 6010		09/06	09/10	DLG
Chromium	0.96		mg/L	EPA 6010		09/06	09/10	DLG
Cobalt	0.98		mg/L	EPA 6010		09/06	09/10	DLG
Copper	0.97		mg/L	EPA 6010		09/06	09/10	DLG
Iron	1.20		mg/L	EPA 6010		09/06	09/10	DLG
Lead	0.91		mg/L	EPA 6010		09/06	09/10	DLG
Magnesium	23		mg/L	EPA 6010		09/06	09/10	DLG
Manganese	0.97		mg/L	EPA 6010		09/06	09/10	DLG
Molybdenum	0.98		mg/L	EPA 6010		09/06	09/10	DLG
Nickel	0.94		mg/L	EPA 6010		09/06	09/10	DLG
Potassium	8.7		mg/L	EPA 6010		09/06	09/10	DLG

COMMERCIAL TESTING & ENGINEERING CO.
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REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4394-3
Client Sample ID :BRW-BKGD-SW02 BARROW SPIKE
Matrix :WATER

Selenium	0.86	mg/L	EPA 6010		09/06	09/10	DLG
Silver	0.17	mg/L	EPA 6010		09/06	09/10	DLG
Sodium	55	mg/L	EPA 6010		09/06	09/10	DLG
Thallium	0.0173	mg/L	EPA 7841		09/06	09/08	BMW
Vanadium	0.92	mg/L	EPA 6010		09/06	09/10	DLG
Zinc	0.93	mg/L	EPA 6010		09/06	09/10	DLG
Dissolved Metals Analys	---		-				
ICP Screen, ICF			EPA	n/a			
-Aluminum	1.01	mg/L	EPA 6010		09/06	09/10	DLG
Antimony	0.88	mg/L	EPA 6010		09/06	09/10	DLG
Arsenic	0.92	mg/L	EPA 6010		09/06	09/10	DLG
Barium	1.02	mg/L	EPA 6010		09/06	09/10	DLG
Beryllium	0.38	mg/L	EPA 6010		09/06	09/10	DLG
Cadmium	0.48	mg/L	EPA 6010		09/06	09/10	DLG
Calcium	24	mg/L	EPA 6010		09/06	09/10	DLG
Chromium	0.97	mg/L	EPA 6010		09/06	09/10	DLG
Cobalt	0.97	mg/L	EPA 6010		09/06	09/10	DLG
Copper	0.96	mg/L	EPA 6010		09/06	09/10	DLG
Iron	1.33	mg/L	EPA 6010		09/06	09/10	DLG
Lead	0.93	mg/L	EPA 6010		09/06	09/10	DLG
Magnesium	23	mg/L	EPA 6010		09/06	09/10	DLG
Manganese	1.00	mg/L	EPA 6010		09/06	09/10	DLG
Molybdenum	1.00	mg/L	EPA 6010		09/06	09/10	DLG
Nickel	0.96	mg/L	EPA 6010		09/06	09/10	DLG
Potassium	8.3	mg/L	EPA 6010		09/06	09/10	DLG
Selenium	0.86	mg/L	EPA 6010		09/06	09/10	DLG
Silver	0.16	mg/L	EPA 6010		09/06	09/10	DLG
Sodium	53	mg/L	EPA 6010		09/06	09/10	DLG
Thallium	0.0151	mg/L	EPA 7841		09/06	09/08	BMW
Vanadium	0.93	mg/L	EPA 6010		09/06	09/10	DLG
Zinc	0.93	mg/L	EPA 6010		09/06	09/10	DLG
TOC, Nonpurgable			EPA 9060	n/a			
...TOC Range	42.8-47.5	mg/L	EPA 9060			09/08	CMR
...TOC Concentration	44.7	mg/L	EPA 9060			09/08	CMR

* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

Chemlab Ref.# :93.4394-5
Client Sample ID :BRW-BKGD-SW02 BARROW SPIKE DUPLICATE
Matrix :WATER

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS
Project# :41096-412-01
PWSID :UA

WORK Order :70157
Report Completed :09/28/93
Collected :08/26/93 @ 11:20 hrs
Received :08/28/93 @ 09:35 hrs
Technical Director:STEPHEN C. EDE
Released By :

Sample Remarks: SAMPLE COLLECTED BY: D. NOE, AND S.S. SEPPOVEN. FOR PERCENT RECOVERIES AND RPD CALCULATIONS, SEE QC SUMMARY.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Semivolatile Organics				EPA 8270				
Phenol	0.145		mg/L	EPA 8270		09/02	09/24	MTT
bis(2-Chloroethyl)ether	0.036	U	mg/L	EPA 8270		09/02	09/24	MTT
2-Chlorophenol	0.137		mg/L	EPA 8270		09/02	09/24	MTT
1,3-Dichlorobenzene	0.036	U	mg/L	EPA 8270		09/02	09/24	MTT
1,4-Dichlorobenzene	0.184		mg/L	EPA 8270		09/02	09/24	MTT
Benzyl Alcohol	0.036	U	mg/L	EPA 8270		09/02	09/24	MTT
1,2-Dichlorobenzene	0.036	U	mg/L	EPA 8270		09/02	09/24	MTT
2-Methylphenol	0.036	U	mg/L	EPA 8270		09/02	09/24	MTT
bis(2-Chloroisopropyl)e	0.036	U	mg/L	EPA 8270		09/02	09/24	MTT
4-Methylphenol	0.036	U	mg/L	EPA 8270		09/02	09/24	MTT
n-Nitroso-di-n-Propylam	0.265		mg/L	EPA 8270		09/02	09/24	MTT
Hexachloroethane	0.036	U	mg/L	EPA 8270		09/02	09/24	MTT
Nitrobenzene	0.036	U	mg/L	EPA 8270		09/02	09/24	MTT
Isophorone	0.036	U	mg/L	EPA 8270		09/02	09/24	MTT
2-Nitrophenol	0.036	U	mg/L	EPA 8270		09/02	09/24	MTT
2,4-Dimethylphenol	0.036	U	mg/L	EPA 8270		09/02	09/24	MTT
Benzoic Acid	0.036	U	mg/L	EPA 8270		09/02	09/24	MTT
bis(2-Chloroethoxy)Meth	0.036	U	mg/L	EPA 8270		09/02	09/24	MTT
2,4-Dichlorophenol	0.036	U	mg/L	EPA 8270		09/02	09/24	MTT
1,2,4-Trichlorobenzene	0.210		mg/L	EPA 8270		09/02	09/24	MTT
Naphthalene	0.036	U	mg/L	EPA 8270		09/02	09/24	MTT
4-Chloroaniline	0.036	U	mg/L	EPA 8270		09/02	09/24	MTT
Hexachlorobutadiene	0.036	U	mg/L	EPA 8270		09/02	09/24	MTT
4-Chloro-3-Methylphenol	0.227		mg/L	EPA 8270		09/02	09/24	MTT
2-Methylnaphthalene	0.036	U	mg/L	EPA 8270		09/02	09/24	MTT
Hexachlorocyclopentadie	0.036	U	mg/L	EPA 8270		09/02	09/24	MTT
2,4,6-Trichlorophenol	0.036	U	mg/L	EPA 8270		09/02	09/24	MTT
2,4,5-Trichlorophenol	0.036	U	mg/L	EPA 8270		09/02	09/24	MTT
2-Chloronaphthalene	0.036	U	mg/L	EPA 8270		09/02	09/24	MTT
2-Nitroaniline	0.036	U	mg/L	EPA 8270		09/02	09/24	MTT
Dimethylphthalate	0.036	U	mg/L	EPA 8270		09/02	09/24	MTT
Acenaphthylene	0.036	U	mg/L	EPA 8270		09/02	09/24	MTT
2,6-Dinitrotoluene	0.036	U	mg/L	EPA 8270		09/02	09/24	MTT
3-Nitroaniline	0.036	U	mg/L	EPA 8270		09/02	09/24	MTT
Acenaphthene	0.240		mg/L	EPA 8270		09/02	09/24	MTT
2,4-Dinitrophenol	0.036	U	mg/L	EPA 8270		09/02	09/24	MTT

COMMERCIAL TESTING & ENGINEERING CO.

ENVIRONMENTAL LABORATORY SERVICES

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

REPORT of ANALYSIS

Chemlab Ref.# :93.4394-5
Client Sample ID :BRW-BKGD-SW02 BARROW SPIKE DUPLICATE
Matrix :WATER

4-Nitrophenol	0.050		mg/L	EPA 8270	09/02	09/24	MTT
Dibenzofuran	0.036	U	mg/L	EPA 8270	09/02	09/24	MTT
2,4-Dinitrotoluene	0.272		mg/L	EPA 8270	09/02	09/24	MTT
Diethylphthalate	0.036	U	mg/L	EPA 8270	09/02	09/24	MTT
4-Chlorophenyl-Phenylet	0.036	U	mg/L	EPA 8270	09/02	09/24	MTT
Fluorene	0.036	U	mg/L	EPA 8270	09/02	09/24	MTT
4-Nitroaniline	0.036	U	mg/L	EPA 8270	09/02	09/24	MTT
4,6-Dinitro-2-Methylphe	0.036	U	mg/L	EPA 8270	09/02	09/24	MTT
n-Nitrosodiphenylamine	0.036	U	mg/L	EPA 8270	09/02	09/24	MTT
4-Bromophenyl-Phenyleth	0.036	U	mg/L	EPA 8270	09/02	09/24	MTT
Hexachlorobenzene	0.036	U	mg/L	EPA 8270	09/02	09/24	MTT
Pentachlorophenol	0.017		mg/L	EPA 8270	09/02	09/24	MTT
Phenanthrene	0.036	U	mg/L	EPA 8270	09/02	09/24	MTT
Anthracene	0.036	U	mg/L	EPA 8270	09/02	09/24	MTT
di-n-Butylphthalate	0.101		mg/L	EPA 8270	09/02	09/24	MTT
Fluoranthene	0.036	U	mg/L	EPA 8270	09/02	09/24	MTT
Pyrene	0.271		mg/L	EPA 8270	09/02	09/24	MTT
Butylbenzylphthalate	0.036	U	mg/L	EPA 8270	09/02	09/24	MTT
3,3-Dichlorobenzidine	0.036	U	mg/L	EPA 8270	09/02	09/24	MTT
Benzo(a)Anthracene	0.036	U	mg/L	EPA 8270	09/02	09/24	MTT
Chrysene	0.036	U	mg/L	EPA 8270	09/02	09/24	MTT
bis(2-Ethylhexyl)Phthal	0.036	U	mg/L	EPA 8270	09/02	09/24	MTT
di-n-Octylphthalate	0.036	U	mg/L	EPA 8270	09/02	09/24	MTT
Benzo(b)Fluoranthene	0.036	U	mg/L	EPA 8270	09/02	09/24	MTT
Benzo(k)Fluoranthene	0.036	U	mg/L	EPA 8270	09/02	09/24	MTT
Benzo(a)Pyrene	0.036	U	mg/L	EPA 8270	09/02	09/24	MTT
Indeno(1,2,3-cd)Pyrene	0.036	U	mg/L	EPA 8270	09/02	09/24	MTT
Dibenz(a,h)Anthracene	0.036	U	mg/L	EPA 8270	09/02	09/24	MTT
Benzo(g,h,i)Perylene	0.036	U	mg/L	EPA 8270	09/02	09/24	MTT

* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

Compiled by sgm 9-15-95

ICF ID	BRW-BKGD-S01	BRW-BKGD-S02	BRW-BKGD-S03
F&BI Number	820	822	824
Sample Type	soil	soil	soil
Date Received	8/27/93	8/27/93	8/27/93
% Dry Weight	28	29	55
Sequence Date	#6-08/28/93	#6-08/28/93	#6-08/28/93
Leaded Gas			
JP-4	<180	<170	<100
Lube Oil	<360	<340	<180
Diesel	<180 J	<170 J	~~<40~~ <90 J
Spike Level			
Unknown Semi-vola	40 biogenic	70 biogenic	20 biogenic
Pentacosane	110	114	108
Sequence Date	#6-08/28/93	#6-08/28/93	#6-08/28/93
PCB 1221	<~~0.1~~ <0.4 J	<~~0.1~~ <0.3 J	<~~0.1~~ <0.2 J
PCB 1232	<~~0.1~~	<~~0.1~~	<~~0.1~~
PCB 1016	<~~0.1~~	<~~0.1~~	<~~0.1~~
PCB 1242	<~~0.1~~	<~~0.1~~	<~~0.1~~
PCB 1248	<~~0.1~~	<~~0.1~~	<~~0.1~~
PCB 1254	<~~0.1~~	<~~0.1~~	<~~0.1~~
PCB 1260	<~~0.1~~	<~~0.1~~	<~~0.1~~
Spike Level			
Dibutyl Chlorendate	107	106	100
Sequence Date	#6-08/28/93	#6-08/28/93	#6-08/28/93
alpha-BHC	<~~0.01~~ <0.4 J	<~~0.01~~ <0.3 J	<~~0.01~~ <0.2 J
beta-BHC	<~~0.01~~	<~~0.01~~	<~~0.01~~
gamma-BHC	<~~0.01~~	<~~0.01~~	<~~0.01~~
delta-BHC	<~~0.01~~	<~~0.01~~	<~~0.01~~
Heptachlor	<~~0.01~~	<~~0.01~~	<~~0.01~~
Aldrin	<~~0.01~~	<~~0.01~~	<~~0.01~~
Heptachlor Epoxide	<~~0.01~~	<~~0.01~~	<~~0.01~~
Endosulfan I	<~~0.01~~	<~~0.01~~	<~~0.01~~
DDE	<~~0.01~~	<~~0.01~~	<~~0.01~~
Dieldrin	<~~0.01~~	<~~0.01~~	<~~0.01~~
Endrin	<~~0.01~~	<~~0.01~~	<~~0.01~~
Endosulfan II	<~~0.01~~	<~~0.01~~	<~~0.01~~
DDD	<~~0.01~~	<~~0.01~~	<~~0.01~~
Endrin Aldehyde	<~~0.01~~	<~~0.01~~	<~~0.01~~
DDT	<~~0.01~~	<~~0.01~~	<~~0.01~~
Endosulfan Sulfate	<~~0.01~~	<~~0.01~~	<~~0.01~~
Endrin Ketone	<~~0.01~~	<~~0.01~~	<~~0.01~~
Methoxy Chlor	<0.1 R	<0.1 R	<0.1 R
Chlordane	<~~0.5~~ <1.8 J	<~~0.5~~ <1.7 J	<~~0.5~~ <0.9 J
Dibutyl Chlorendate	107	106	100
Spike Level			
Vol Sequence	#3-08/28/93, #4-08/29/93	#3-08/28/93, #4-08/29/93	#3-08/28/93, #4-08/29/93
CCl4	<0.07	<0.07	<~~0.07~~ <.04
TCA	<0.07	<0.07	<~~0.07~~
Benzene	<0.07	<0.07	<~~0.07~~
TCE	<0.07	<0.07	<~~0.07~~
Toluene	<0.07	<0.07	<~~0.07~~
PCE	<0.07	<0.07	<~~0.07~~
Ethylbenzene	<0.07	<0.07	<~~0.07~~
Xylenes	<0.1	<0.1	~~<0.1~~ <.07
Gasoline	<7 J	<7 J	~~<7~~ <4 J
Spike level			
BFB	110	120	79

compiled by SJM 9-15-9

ICF ID	BRW-BKGD-S04	BRW-BKGD-SD01	BRW-BKGD-SD01
F&BI Number	826	818	828
Sample Type	soil	soil	soil
Date Received	8/27/93	8/27/93	8/27/93
% Dry Weight	76	65	96
Sequence Date	#6-08/28/93	#6-08/28/93	#6-08/28/93
Leaded Gas			
JP-4	<70	<80	<50
Lube Oil	<130	<150	<100
Diesel	<~~130~~ <65 J	<80 J	270
Spike Level			
Unknown Semi-vola	30 biogenic		
Pentacosane	104	100	107
Sequence Date	#6-08/28/93	#6-08/28/93	
PCB 1221	<0.1	<0.1	
PCB 1232	<0.1	<0.1	
PCB 1016	<0.1	<0.1	
PCB 1242	<0.1	<0.1	
PCB 1248	<0.1	<0.1	
PCB 1254	<0.1	<0.1	
PCB 1260	<0.1	<0.1	
Spike Level			
Dibutyl Chlorendate	96	102	
Sequence Date	#6-08/28/93	#6-08/28/93	
alpha-BHC	<0.01 J	<0.01 J	
beta-BHC	<0.01	<0.01	
gamma-BHC	<0.01	<0.01	
delta-BHC	<0.01	<0.01	
Heptachlor	<0.01	<0.01	
Aldrin	<0.01	<0.01	
Heptachlor Epoxide	<0.01	<0.01	
Endosulfan I	<0.01	<0.01	
DDE	<0.01	<0.01	
Dieldrin	<0.01	<0.01	
Endrin	<0.01	<0.01	
Endosulfan II	<0.01	<0.01	
DDD	<0.01	<0.01	
Endrin Aldehyde	<0.01	<0.01	
DDT	<0.01	<0.01	
Endosulfan Sulfate	<0.01	<0.01	
Endrin Ketone	<0.01	<0.01	
Methoxy Chlor	<0.1 R	<0.1 R	
Chlordane	<0.5	<0.5 J	
Dibutyl Chlorendate	96	102	
Spike Level			
Vol Sequence	#3-08/28/93, #4-08/29/93	#3-08/28/93, #4-08/29/93	#3-08/28/93, #4-08/29/93
CCl4	<~~0.07~~ <.03	<0.03	<0.02
TCA	<~~0.07~~	<0.03	<0.02
Benzene	<~~0.07~~	<0.03	<0.02
TCE	<~~0.07~~	<0.03	<0.02
Toluene	<~~0.07~~	<0.03	0.15
PCE	<~~0.07~~	<0.03	<0.02
Ethylbenzene	<~~0.07~~	<0.03	<0.02
Xylenes	<~~0.1~~ <.05	<0.06	0.19
Gasoline	~~<7~~ <3 J	<3 J	<2
Spike level			
BFB	109	107	106

Compiled by SAM 9-15-95

ICF ID	BRW-BKGD-SW01	BRW-BKGD-SW01	BRW-BKGD-SW02
F&BI Number	778	780	784
Sample Type	water	water	water
Date Received	8/26/93	8/27/93	8/26/93
% Dry Weight			
Sequence Date	#5-09/01/93		#5-09/01/93
Leaded Gas			
JP-4	<200		<200
Lube Oil	<2000		<2000
Diesel	~~<200~~ <2500		~~<200~~ <2500
Spike Level			
Unknown Semi-vola			
Pentacosane	97		77
Sequence Date	#5-09/01/93		#5-09/01/93
PCB 1221	~~<2~~ <5		~~<2~~ <5
PCB 1232	~~<2~~		~~<2~~
PCB 1016	~~<2~~		~~<2~~
PCB 1242	~~<2~~		~~<2~~
PCB 1248	~~<2~~		~~<2~~
PCB 1254	~~<2~~		~~<2~~
PCB 1260	~~<2~~		~~<2~~
Spike Level			
Dibutyl Chlorendate	112		86
Sequence Date	#5-09/01/93		#5-09/01/93
alpha-BHC	~~<0.2~~ <0.5		~~<0.2~~ <0.5
beta-BHC	~~<0.2~~		~~<0.2~~
gamma-BHC	~~<0.2~~		~~<0.2~~
delta-BHC	~~<0.2~~		~~<0.2~~
Heptachlor	~~<0.2~~		~~<0.2~~
Aldrin	~~<0.2~~		~~<0.2~~
Heptachlor Epoxide	~~<0.2~~		~~<0.2~~
Endosulfan I	~~<0.2~~ <0.5 J		~~<0.2~~ <0.5 J
DDE	~~<0.2~~ <0.5		~~<0.2~~ <0.5
Dieldrin	~~<0.2~~ <0.5		~~<0.2~~ <0.5
Endrin	~~<0.2~~ <0.5 J		~~<0.2~~ <0.5 J
Endosulfan II	~~<0.2~~ <0.5		~~<0.2~~ <0.5
DDD	~~<0.2~~ <0.5 J		~~<0.2~~ <0.5 J
Endrin Aldehyde	~~<0.2~~ <0.5		~~<0.2~~ <0.5
DDT	~~<0.2~~		~~<0.2~~
Endosulfan Sulfate	~~<0.2~~		~~<0.2~~
Endrin Ketone	~~<0.2~~		~~<0.2~~
Methoxy Chlor	~~<2~~ <5 R		~~<2~~ <5 R
Chlordane	~~<10~~ <50 R		~~<10~~ <50 R
Dibutyl Chlorendate	112		130
Spike Level			
Vol Sequence		#1&2-08/25/93	
CCl4		<1	
TCA		<1	
Benzene		<1	
TCE		<1	
Toluene		<1	
PCE		<1	
Ethylbenzene		<1	
Xylenes		<2	
Gasoline		<50 J	
Spike level			
BFB		124	

Compiled by sgm 9-15-95

ICF ID	BRW-BKGD-SW02
F&BI Number	786
Sample Type	water
Date Received	8/27/93
% Dry Weight	
Sequence Date	
Leaded Gas	
JP-4	
Lube Oil	
Diesel	
Spike Level	
Unknown Semi-vola	
Pentacosane	
Sequence Date	
PCB 1221	
PCB 1232	
PCB 1016	
PCB 1242	
PCB 1248	
PCB 1254	
PCB 1260	
Spike Level	
Dibutyl Chlorendate	
Sequence Date	
alpha-BHC	
beta-BHC	
gamma-BHC	
delta-BHC	
Heptachlor	
Aldrin	
Heptachlor Epoxide	
Endosulfan I	
DDE	
Dieldrin	
Endrin	
Endosulfan II	
DDD	
Endrin Aldehyde	
DDT	
Endosulfan Sulfate	
Endrin Ketone	
Methoxy Chlor	
Chlordane	
Dibutyl Chlorendate	
Spike Level	
Vol Sequence	#1&2-08/25/93
CCl4	<1
TCA	<1
Benzene	<1
TCE	<1
Toluene	<1
PCE	<1
Ethylbenzene	<1
Xylenes	<2
Gasoline	<50 J
Spike level	
BFB	124

ANALYTICAL DATA SHEETS FOR QA/QC

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4395-2
Client Sample ID :BRW-AB01 BARROW
Matrix :WATER

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70159
Report Completed :09/29/93
Collected :08/26/93 @ 15:05 hrs.
Received :08/28/93 @ 09:30 hrs.
Technical Director:STEPHEN C. EDE
Released By :

Sample Remarks: SAMPLE COLLECTED BY: D. NOE, JEFF J. DAWSON, AND S.S. SEPPOVEN.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Volatile Organics				EPA 8260				
Benzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Bromobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Bromochloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Bromodichloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Bromoform	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Bromomethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
n-Butylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
sec-Butylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
tert-Butylbenzne	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Carbon Tetrachloride	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Chlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Chloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Chloroform	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Chloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
2-Chlorotoluene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
4-Chlorotoluene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Dibromochloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
12Dibromo3Chloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,2-Dibromoethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Dibromomethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,2-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,3-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,4-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Dichlorodifluoromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,1-Dichloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,2-Dichloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,1-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
cis-1,2-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
trans1,2-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,2-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,3-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
2,2-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,1-Dichloropropene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Ethylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Hexachlorobutadiene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Isopropylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
-Isopropyltoluene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4395-2
Client Sample ID :BRW-AB01 BARROW
Matrix :WATER

Methylene Chloride	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
Napthalene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
n-Propylbenzene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
Styrene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1112-Tetrachloroethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1122-Tetrachloroethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
Tetrachloroethene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
Toluene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1,2,3-Trichlorobenzene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1,2,4-Trichlorobenzene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1,1,1-Trichloroethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1,1,2-Trichloroethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
Trichloroethene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
Trichlorofluoromethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1,2,3-Trichloropropane	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1,2,4-Trimethylbenzene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1,3,5-Trimethylbenzene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
Vinyl Chloride	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
p+m-Xylene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
o-Xylene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM

* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

Chemlab Ref.# :93.4424-4
Client Sample ID :BRW-EB01 BARROW
Matrix :WATER

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70209
Report Completed :11/02/93
Collected :08/27/93 @ 12:00 hrs.
Received :08/29/93 @ 12:45 hrs.
Technical Director:STEPHEN C. EDE
Released By : C. Homestead

Sample Remarks: SAMPLE COLLECTED BY: D. NOE AND ROBERT C.C. 8270 HOLDING/TIME WAS EXCEEDED, SAMPLE NOT ANALYZED AS PER CLIENT.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Volatile Organics				EPA 8260				
Benzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Bromobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Bromochloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Bromodichloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Bromoform	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Bromomethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
n-Butylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
sec-Butylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
tert-Butylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Carbon Tetrachloride	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Chlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Chloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Chloroform	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Chloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
2-Chlorotoluene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
4-Chlorotoluene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Dibromochloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
12Dibromo3Chloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,2-Dibromoethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Dibromomethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,2-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,3-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,4-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Dichlorodifluoromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,1-Dichloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,2-Dichloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,1-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
cis-1,2-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
trans1,2-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,2-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,3-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
2,2-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,1-Dichloropropene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Ethylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Hexachlorobutadiene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Isopropylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES
SINCE 1909

REPORT of ANALYSIS

Chemlab Ref.# :93.4424-4
Client Sample ID :BRW-EB01 BARROW
Matrix :WATER

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

p-Isopropyltoluene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Methylene Chloride	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Napthalene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
n-Propylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Styrene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1112-Tetrachloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1122-Tetrachloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Tetrachloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Toluene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,2,3-Trichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,2,4-Trichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,1,1-Trichloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,1,2-Trichloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Trichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Trichlorofluoromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,2,3-Trichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,2,4-Trimethylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,3,5-Trimethylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Vinyl Chloride	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
p+m-Xylene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
o-Xylene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Total Metals Analysis	---			-				
ICP Screen, ICP				EPA	n/a			
Aluminum	0.10	U	mg/L	EPA 6010		09/07	09/10	DLG
Antimony	0.10	U	mg/L	EPA 6010		09/07	09/10	DLG
Arsenic	0.10	U	mg/L	EPA 6010		09/07	09/10	DLG
Barium	0.050	U	mg/L	EPA 6010		09/07	09/10	DLG
Beryllium	0.050	U	mg/L	EPA 6010		09/07	09/10	DLG
Cadmium	0.050	U	mg/L	EPA 6010		09/07	09/10	DLG
Calcium	0.22		mg/L	EPA 6010		09/07	09/10	DLG
Chromium	0.050	U	mg/L	EPA 6010		09/07	09/10	DLG
Cobalt	0.050	U	mg/L	EPA 6010		09/07	09/10	DLG
Copper	0.050	U	mg/L	EPA 6010		09/07	09/10	DLG
Iron	0.10	U	mg/L	EPA 6010		09/07	09/10	DLG
Lead	0.10	U	mg/L	EPA 6010		09/07	09/10	DLG
Magnesium	0.20	U	mg/L	EPA 6010		09/07	09/10	DLG
Manganese	0.050	U	mg/L	EPA 6010		09/07	09/10	DLG
Molybdenum	0.050	U	mg/L	EPA 6010		09/07	09/10	DLG
Nickel	0.050	U	mg/L	EPA 6010		09/07	09/10	DLG
Potassium	5.0	U	mg/L	EPA 6010		09/07	09/10	DLG
Selenium	0.10	U	mg/L	EPA 6010		09/07	09/10	DLG
Silver	0.050	U	mg/L	EPA 6010		09/07	09/10	DLG
Sodium	0.25	U	mg/L	EPA 6010		09/07	09/10	DLG
Thallium	0.005	U	mg/L	EPA 7841		09/06	09/08	BMW
Vanadium	0.050	U	mg/L	EPA 6010		09/07	09/10	DLG
Zinc	0.050	U	mg/L	EPA 6010		09/11	09/14	DFL

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* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

SINCE 1908

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4627-23
Client Sample ID :BRW-2EB02 BARROW
Matrix :WATER

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70637
Report Completed :10/05/93
Collected :09/06/93 @ 16:50 hrs.
Received :09/07/93 @ 11:00 hrs.
Technical Director:STEPHEN C. EDE
Released By : C. Homestead

Sample Remarks: SAMPLE COLLECTED BY: S.M. AND J.P.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Hydrocarbons VPH	0.020	U	mg/L	EPA 5030/8015M		09/10	09/10	WLS
Volatile Organics				EPA 8260				
Benzene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
Bromobenzene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
Bromochloromethane	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
Bromodichloromethane	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
Bromoform	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
Bromomethane	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
n-Butylbenzene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
sec-Butylbenzene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
tert-Butylbenzne	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
Carbon Tetrachloride	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
Chlorobenzene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
Chloroethane	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
Chloroform	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
Chloromethane	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
2-Chlorotoluene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
4-Chlorotoluene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
Dibromochloromethane	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
12Dibromo3Chloropropane	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
1,2-Dibromoethane	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
Dibromomethane	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
1,2-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
1,3-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
1,4-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
Dichlorodifluoromethane	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
1,1-Dichloroethane	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
1,2-Dichloroethane	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
1,1-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
cis-1,2-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
trans1,2-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
1,2-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
1,3-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
2,2-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
1,1-Dichloropropene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
Ethylbenzene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
Hexachlorobutadiene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

SINCE 1908

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4627-23
Client Sample ID :BRW-2EB02 BARROW
Matrix :WATER

Isopropylbenzene	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
p-Isopropyltoluene	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
Methylene Chloride	0.0038		mg/L	EPA 8260	09/09	09/09	KWM
Napthalene	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
n-Propylbenzene	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
Styrene	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
1112-Tetrachloroethane	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
1122-Tetrachloroethane	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
Tetrachloroethene	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
Toluene	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
1,2,3-Trichlorobenzene	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
1,2,4-Trichlorobenzene	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
1,1,1-Trichloroethane	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
1,1,2-Trichloroethane	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
Trichloroethene	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
Trichlorofluoromethane	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
1,2,3-Trichloropropane	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
1,2,4-Trimethylbenzene	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
1,3,5-Trimethylbenzene	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
Vinyl Chloride	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
p+m-Xylene	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
o-Xylene	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM

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* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX (907) 561-5301

Chemlab Ref.# :93.4395-1
Client Sample ID :BRW-TB01 BARROW
Matrix :WATER

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70159
Report Completed :09/29/93
Collected :08/26/93 @ 10:00 hrs.
Received :08/28/93 @ 09:30 hrs.
Technical Director:STEPHEN C. EDE
Released By : Stephen C. Ede

Sample Remarks: SAMPLE COLLECTED BY: D. NOE, JEFF J. DAWSON, AND S.S. SEPPOVEN.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Volatile Organics				EPA 8260				
Benzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Bromobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Bromochloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Bromodichloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Bromoform	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Bromomethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
n-Butylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
sec-Butylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
ert-Butylbenzne	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
arbon Tetrachloride	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Chlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Chloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Chloroform	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Chloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
2-Chlorotoluene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
4-Chlorotoluene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Dibromochloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
12Dibromo3Chloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,2-Dibromoethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Dibromomethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,2-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,3-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,4-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Dichlorodifluoromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,1-Dichloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,2-Dichloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,1-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
cis-1,2-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
trans1,2-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,2-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,3-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
2,2-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
1,1-Dichloropropene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Ethylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Hexachlorobutadiene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
Isopropylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM
-Isopropyltoluene	0.0010	U	mg/L	EPA 8260		09/03	09/03	MCM

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX (907) 561-5301

Chemlab Ref.# :93.4395-1
Client Sample ID :BRW-TB01 BARROW
Matrix :WATER

Methylene Chloride	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
Napthalene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
n-Propylbenzene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
Styrene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1112-Tetrachloroethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1122-Tetrachloroethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
Tetrachloroethene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
Toluene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1,2,3-Trichlorobenzene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1,2,4-Trichlorobenzene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1,1,1-Trichloroethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1,1,2-Trichloroethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
Trichloroethene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
Trichlorofluoromethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1,2,3-Trichloropropane	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1,2,4-Trimethylbenzene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
1,3,5-Trimethylbenzene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
Vinyl Chloride	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
p+m-Xylene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM
o-Xylene	0.0010	U	mg/L	EPA 8260	09/03	09/03	MCM

* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4424-5
Client Sample ID :BRW-TB01 BARROW
Matrix :WATER 2

SMF 12.13.94

Client Name	:ICF KAISER ENGINEERING	WORK Order	:70209
Ordered By	:RAY MORRIS	Report Completed	:11/02/93
Project Name	:DEW LINE RI/FS BARROW	Collected	:08/27/93 @ 10:00 hrs
Project#	:41096-412-01	Received	:08/29/93 @ 12:45 hrs
PWSID	:UA	Technical Director	:STEPHEN C. EDE
		Released By	:

Sample Remarks: SAMPLE COLLECTED BY: D. NOE AND ROBERT C.C.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Volatile Organics				EPA 8260				
Benzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Bromobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Bromochloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Bromodichloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Bromoform	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Bromomethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
n-Butylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
sec-Butylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
tert-Butylbenzne	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Carbon Tetrachloride	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Chlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Chloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Chloroform	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Chloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
2-Chlorotoluene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
4-Chlorotoluene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Dibromochloromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
12Dibromo3Chloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,2-Dibromoethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Dibromomethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,2-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,3-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,4-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Dichlorodifluoromethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,1-Dichloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,2-Dichloroethane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,1-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
cis-1,2-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
trans1,2-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,2-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,3-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
2,2-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
1,1-Dichloropropene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Ethylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Hexachlorobutadiene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
Isopropylbenzene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM
p-Isopropyltoluene	0.0010	U	mg/L	EPA 8260		09/03	09/03	KWM

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

SINCE 1908

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4424-5
Client Sample ID :BRW-TB01 BARROW
Matrix :WATER

Methylene Chloride	0.0010	U	mg/L	EPA 8260	09/03	09/03	KWM
Napthalene	0.0010	U	mg/L	EPA 8260	09/03	09/03	KWM
n-Propylbenzene	0.0010	U	mg/L	EPA 8260	09/03	09/03	KWM
Styrene	0.0010	U	mg/L	EPA 8260	09/03	09/03	KWM
1112-Tetrachloroethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	KWM
1122-Tetrachloroethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	KWM
Tetrachloroethene	0.0010	U	mg/L	EPA 8260	09/03	09/03	KWM
Toluene	0.0010	U	mg/L	EPA 8260	09/03	09/03	KWM
1,2,3-Trichlorobenzene	0.0010	U	mg/L	EPA 8260	09/03	09/03	KWM
1,2,4-Trichlorobenzene	0.0010	U	mg/L	EPA 8260	09/03	09/03	KWM
1,1,1-Trichloroethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	KWM
1,1,2-Trichloroethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	KWM
Trichloroethene	0.0010	U	mg/L	EPA 8260	09/03	09/03	KWM
Trichlorofluoromethane	0.0010	U	mg/L	EPA 8260	09/03	09/03	KWM
1,2,3-Trichloropropane	0.0010	U	mg/L	EPA 8260	09/03	09/03	KWM
1,2,4-Trimethylbenzene	0.0010	U	mg/L	EPA 8260	09/03	09/03	KWM
1,3,5-Trimethylbenzene	0.0010	U	mg/L	EPA 8260	09/03	09/03	KWM
Vinyl Chloride	0.0010	U	mg/L	EPA 8260	09/03	09/03	KWM
p+m-Xylene	0.0010	U	mg/L	EPA 8260	09/03	09/03	KWM
o-Xylene	0.0010	U	mg/L	EPA 8260	09/03	09/03	KWM

* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

Chemlab Ref.# :93.4627-22
Client Sample ID :BRW-2TB03 BARROW
Matrix :WATER

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Client Name :ICF KAISER ENGINEERING
Ordered By :RAY MORRIS
Project Name :DEW LINE RI/FS BARROW
Project# :41096-412-01
PWSID :UA

WORK Order :70637
Report Completed :10/05/93
Collected :09/06/93 @ 10:00 hrs.
Received :09/07/93 @ 11:00 hrs.
Technical Director:STEPHEN C. EDE
Released By : C. Homestead

Sample Remarks: SAMPLE COLLECTED BY: S.M. AND J.P.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Volatile Organics				EPA 8260				
Benzene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
Bromobenzene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
Bromochloromethane	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
Bromodichloromethane	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
Bromoform	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
Bromomethane	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
n-Butylbenzene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
sec-Butylbenzene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
tert-Butylbenzne	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
Carbon Tetrachloride	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
Chlorobenzene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
Chloroethane	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
Chloroform	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
Chloromethane	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
2-Chlorotoluene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
4-Chlorotoluene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
Dibromochloromethane	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
12Dibromo3Chloropropane	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
1,2-Dibromoethane	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
Dibromomethane	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
1,2-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
1,3-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
1,4-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
Dichlorodifluoromethane	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
1,1-Dichloroethane	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
1,2-Dichloroethane	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
1,1-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
cis-1,2-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
trans1,2-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
1,2-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
1,3-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
2,2-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
1,1-Dichloropropene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
Ethylbenzene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
Hexachlorobutadiene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
Isopropylbenzene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM
p-Isopropyltoluene	0.0010	U	mg/L	EPA 8260		09/09	09/09	KWM

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

SINCE 1908

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

REPORT of ANALYSIS

Chemlab Ref.# :93.4627-22
Client Sample ID :BRW-2TB03 BARROW
Matrix :WATER

Methylene Chloride	0.0060		mg/L	EPA 8260	09/09	09/09	KWM
Napthalene	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
n-Propylbenzene	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
Styrene	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
1112-Tetrachloroethane	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
1122-Tetrachloroethane	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
Tetrachloroethene	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
Toluene	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
1,2,3-Trichlorobenzene	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
1,2,4-Trichlorobenzene	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
1,1,1-Trichloroethane	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
1,1,2-Trichloroethane	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
Trichloroethene	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
Trichlorofluoromethane	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
1,2,3-Trichloropropane	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
1,2,4-Trimethylbenzene	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
1,3,5-Trimethylbenzene	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
Vinyl Chloride	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
p+m-Xylene	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM
o-Xylene	0.0010	U	mg/L	EPA 8260	09/09	09/09	KWM

==

* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4696-1
Client Sample ID :BRW-TB04 BARROW
Matrix :WATER

2 smf 12.13.94

Client Name :ICF KAISER ENGINEERING
Ordered By :SHERI K ACE
Project Name :DEW LINE RI/FS
Project# :41096-412-01
PWSID :UA

WORK Order :70737
Report Completed :10/21/93
Collected :09/08/93 @ 18:00 hrs
Received :09/09/93 @ 12:00 hrs
Technical Director:STEPHEN C. EDE
Released By :

Sample Remarks: SAMPLE COLLECTED BY: R TAUFFE AND R.C.C.

Parameter	Results	QC Qual	Units	Method	Allowable Limits	Ext. Date	Anal Date	Init
Volatile Organics								
Benzene	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
Bromobenzene	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
Bromochloromethane	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
Bromodichloromethane	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
Bromoform	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
Bromomethane	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
n-Butylbenzene	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
sec-Butylbenzene	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
tert-Butylbenzne	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
Carbon Tetrachloride	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
Chlorobenzene	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
Chloroethane	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
Chloroform	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
Chloromethane	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
2-Chlorotoluene	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
4-Chlorotoluene	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
Dibromochloromethane	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
12Dibromo3Chloropropane	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
1,2-Dibromoethane	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
Dibromomethane	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
1,2-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
1,3-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
1,4-Dichlorobenzene	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
Dichlorodifluoromethane	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
1,1-Dichloroethane	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
1,2-Dichloroethane	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
1,1-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
cis-1,2-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
trans1,2-Dichloroethene	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
1,2-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
1,3-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
2,2-Dichloropropane	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
1,1-Dichloropropene	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
Ethylbenzene	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
Hexachlorobutadiene	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
Isopropylbenzene	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM
p-Isopropyltoluene	0.0010	U	mg/L	EPA 8260		09/21	09/21	MCM

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

SINCE 1908

REPORT of ANALYSIS

5633 B STREET
ANCHORAGE, AK 99518
TEL: (907) 562-2343
FAX: (907) 561-5301

Chemlab Ref.# :93.4696-1
Client Sample ID :BRW-TB04 BARROW
Matrix :WATER

Methylene Chloride	0.0050		mg/L	EPA 8260	09/21	09/21	MCM
Napthalene	0.0010	U	mg/L	EPA 8260	09/21	09/21	MCM
n-Propylbenzene	0.0010	U	mg/L	EPA 8260	09/21	09/21	MCM
Styrene	0.0010	U	mg/L	EPA 8260	09/21	09/21	MCM
1112-Tetrachloroethane	0.0010	U	mg/L	EPA 8260	09/21	09/21	MCM
1122-Tetrachloroethane	0.0010	U	mg/L	EPA 8260	09/21	09/21	MCM
Tetrachloroethene	0.0010	U	mg/L	EPA 8260	09/21	09/21	MCM
Toluene	0.0010	U	mg/L	EPA 8260	09/21	09/21	MCM
1,2,3-Trichlorobenzene	0.0010	U	mg/L	EPA 8260	09/21	09/21	MCM
1,2,4-Trichlorobenzene	0.0010	U	mg/L	EPA 8260	09/21	09/21	MCM
1,1,1-Trichloroethane	0.0010	U	mg/L	EPA 8260	09/21	09/21	MCM
1,1,2-Trichloroethane	0.0010	U	mg/L	EPA 8260	09/21	09/21	MCM
Trichloroethene	0.0010	U	mg/L	EPA 8260	09/21	09/21	MCM
Trichlorofluoromethane	0.0010	U	mg/L	EPA 8260	09/21	09/21	MCM
1,2,3-Trichloropropane	0.0010	U	mg/L	EPA 8260	09/21	09/21	MCM
1,2,4-Trimethylbenzene	0.0010	U	mg/L	EPA 8260	09/21	09/21	MCM
1,3,5-Trimethylbenzene	0.0010	U	mg/L	EPA 8260	09/21	09/21	MCM
Vinyl Chloride	0.0010	U	mg/L	EPA 8260	09/21	09/21	MCM
p+m-Xylene	0.0010	U	mg/L	EPA 8260	09/21	09/21	MCM
o-Xylene	0.0010	U	mg/L	EPA 8260	09/21	09/21	MCM

* See Special Instructions Above
** See Sample Remarks Above
U = Undetected, Reported value is the practical quantification limit.
D = Secondary dilution.

UA = Unavailable
NA = Not Analyzed
LT = Less Than
GT = Greater Than

Compiled by SJM 9-15-95

ICF ID	BRW-EB-01	BRW-EB01
F&BI Number	1156	1158
Sample Type	water	water
Date Received	8/27/93	8/27/93
% Dry Weight		
Sequence Date	#5-09/01/93	
Leaded Gas		
JP-4	<200	
Lube Oil	<2000	
Diesel	<~~200~~ <2500	
Spike Level		
Unknown Semi-vola		
Pentacosane	100	
Sequence Date	#5-09/01/93	
PCB 1221	<~~2~~ <5	
PCB 1232	<~~2~~	
PCB 1016	<~~2~~	
PCB 1242	<2	
PCB 1248	<~~2~~	
PCB 1254	<~~2~~	
PCB 1260	<~~2~~	
Spike Level		
Dibutyl Chlorendate	97	
Sequence Date	#5-09/01/93	
alpha-BHC	<~~0.2~~ <0.5	
beta-BHC	<~~0.2~~	
gamma-BHC	<~~0.2~~	
delta-BHC	<~~0.2~~	
Heptachlor	<~~0.2~~	
Aldrin	<~~0.2~~	
Heptachlor Epoxide	<~~0.2~~	
Endosulfan I	<~~0.2~~ <0.5 J	
DDE	<~~0.2~~ <0.5	
Dieldrin	<~~0.2~~ <0.5	
Endrin	<~~0.2~~ <0.5 J	
Endosulfan II	<~~0.2~~ <0.5	
DDD	<~~0.2~~ <0.5 J	
Endrin Aldehyde	<~~0.2~~ <0.5	
DDT	<~~0.2~~	
Endosulfan Sulfate	<~~0.2~~	
Endrin Ketone	<~~0.2~~	
Methoxy Chlor	<~~2~~ <5 R	
Chlordane	<~~10~~ <25 R	
Dibutyl Chlorendate	89	
Spike Level		
Vol Sequence		#3&4-09/02/93
CCl4		<1
TCA		<1
Benzene		<1
TCE		<1
Toluene		<1
PCE		<1
Ethylbenzene		<1
Xylenes		<2
Gasoline		<~~50~~ <100 J
Spike level		
BFB		131

Compiled by sfm 9-15-95

ICF ID	BRW-TB01	BRW-TB02
F&BI Number	776	1154
Sample Type	water	water
Date Received	8/27/93	8/27/93
% Dry Weight		
Sequence Date		
Leaded Gas		
JP-4		
Lube Oil		
Diesel		
Spike Level		
Unknown Semi-vola		
Pentacosane		
Sequence Date		
PCB 1221		
PCB 1232		
PCB 1016		
PCB 1242		
PCB 1248		
PCB 1254		
PCB 1260		
Spike Level		
Dibutyl Chlorendate		
Sequence Date		
alpha-BHC		
beta-BHC		
gamma-BHC		
delta-BHC		
Heptachlor		
Aldrin		
Heptachlor Epoxide		
Endosulfan I		
DDE		
Dieldrin		
Endrin		
Endosulfan II		
DDD		
Endrin Aldehyde		
DDT		
Endosulfan Sulfate		
Endrin Ketone		
Methoxy Chlor		
Chlordane		
Dibutyl Chlorendate		
Spike Level		
Vol Sequence	#1&2-08/25/93	#3&4-09/02/93
CCl4	<1	<1
TCA	<1	<1
Benzene	<1	<1
TCE	<1	<1
Toluene	<1	<1
PCE	<1	<1
Ethylbenzene	<1	<1
Xylenes	<2	<2
Gasoline	<50 J	~~<50~~ <100 J
Spike level		
BFB	127	95

APPENDIX G

DATA VALIDATION SUMMARIES

ICF KAISER ENGINEERS

ICF Kaiser Engineers, Inc.
1800 Harrison Street
P.O. Box 23210
Oakland, California 94612-3430
510/419-6000 FAX 510/419-5355

DATA VALIDATION REPORT

PROGRAM:	Elmendorf AFB/Point Barrow RI/FS (ICF Project No. 41096-412-02)
LABORATORY:	Commercial Testing & Engineering Co. (Anchorage, AK)
REVIEWER:	Cynthia Schlag, ICF Kaiser Engineers
ANALYSIS:	Extractable Petroleum Hydrocarbons by USEPA Method 8100M
MATRIX:	Soil
DATE:	February 22, 1994 (revised May 19, 1994)

I. INTRODUCTION:

Commercial Testing & Engineering Co. (Anchorage, AK) received two (2) soil samples for extractable petroleum hydrocarbons (EPH) analyses by modified USEPA Method 8100 on September 6, 1993. The samples were extracted on September 14, 1993 and analyzed for EPH by gas chromatography with flame ionization detection (GC/FID) on September 16 and 17, 1993.

The ICF site identification numbers and corresponding Commercial Testing & Engineering Co. sample identification numbers are listed below.

ICF Site No.	Lab Sample No.
BRW-SS02-2S06	93.4627-01
BRW-SS01-2S07	93.4627-05

Thewere no QC sample designations included in project documentation.

Soil sample results and quantitation limits were reported by the laboratory with an adjustment for moisture content.

The analytical results with qualifications are presented on modified sample data sheets included in the report appendix. Definitions of data qualifiers are provided in Table 1B. This report was prepared according to the USEPA draft document "National Functional Guidelines for Organic Data Review" (December 1990), USEPA SW-846 Method 8100M and the Project Sampling and Analysis Plan.

II. VALIDITY and COMMENTS:

A. Technical Holding Times:

A.1 Technical holding time QC criteria were met for all project sample analyses.

B. Initial Calibration:
B.1 All QC criteria for the initial calibration were met and the results are considered acceptable.

C. Continuing Calibration:
C.1 All QC criteria for the continuing calibration were met and the results are considered acceptable.

D. Laboratory Blanks:
D.1 All target analytes were not detected in the method blank at concentrations above the Practical Quantitation Limits (PQL) and the results are considered acceptable.

E. Surrogate Recoveries:
E.1 All surrogate recoveries met applicable QC criteria and the results are considered acceptable.

F. Field Blanks:
F.1 No field blank analysis is included with the project documentation.

G. Laboratory Control Sample Analysis:
G.1 Laboratory control sample QC criteria were met for all "blank spike" analyses and the results are considered acceptable.

H. Laboratory Replicate Analysis:
H.1 No laboratory replicate control sample is included with the project documentation.

I. Field Duplicate Analysis:
I.1 No field duplicate analysis is included with the project documentation.

J. Matrix Spike/Matrix Spike Duplicate Analysis:
J.1 The matrix spike (MS) and matrix spike duplicate (MSD) analyses met all QC criteria and results are considered acceptable.

K. Quantitation and Identification
K.1 No problems were observed with analyte quantitation and identification in project sample analysis.

L. Conclusion:
L.1 All data are considered valid and usable for all purposes.

ICF KAISER ENGINEERS

ICF Kaiser Engineers, Inc.
1800 Harrison Street
P.O. Box 23210
Oakland, California 94612-3430
510/419-6000

DATA VALIDATION REPORT

PROGRAM:	Elmendorf AFB/Point Barrow RI/FS (ICF Project No.41096-412-02)
LABORATORY:	Commercial Testing & Engineering Co. (Anchorage, AK)
REVIEWER:	Cynthia E. Schlag
ANALYSIS:	Volatile Petroleum Hydrocarbons by USEPA Method 8015M
MATRIX:	Water and Soil
DATE:	February 22, 1994 (revised May 19, 1994)

I. INTRODUCTION:

Commercial Testing & Engineering Co. (CT&E) (Anchorage, AK) received one (1) soil sample and one (1) water sample for Volatile Petroleum Hydrocarbons (VPH) analysis by USEPA Method 8015M (modified) on September 6, 1993. The samples were analyzed for VPH by gas chromatography with flame ionization detection (GC/FID) on September 10 and 13, 1993.

The ICF site identification numbers and corresponding CT&E laboratory sample identification numbers are listed below.

ICF Site No.	Lab Sample No.	Matrix
BRW-SS02-2S06	93.4627-01	Soil
BRW-2EB-02	93.4627-23	Water

The following QC sample designations are included with the project documentation: sample number BRW-2EB-02 was designated as an "equipment blank."

It should be noted, that all quantitation limits reported by the laboratory for project soil samples were higher than those specified in the Project Sampling and Analysis Plan for USEPA Method 8015M. According to the laboratory, all soil samples were extracted in methanol before analysis as required by State of Alaska guidelines. It is the opinion of the reviewer that the quality of the data was not affected.

The analytical results for project soil samples were reported with an adjustment for moisture content.

The analytical results with qualifications are presented on modified sample data sheets submitted by the laboratory. Definitions of the data qualifiers are listed in Table 1B. This report was prepared according to the USEPA draft document "National Functional Guidelines for Organic Data Review" (December 1990), USEPA Method 8015M and the Project Sampling and Analysis Plan.

II. VALIDITY & COMMENTS:

A. Technical Holding Times:

A.1 Technical holding time QC criteria were met for all project sample analyses.

B. Initial Calibration:

B.1 All QC criteria for the initial calibration were met and the results are considered acceptable.

C. Continuing Calibrations:

C.1 All QC criteria for the continuing calibration were met and the results are considered acceptable.

D. Laboratory Blanks:

D.1 The target analyte was not detected in the method blank at a concentration above the Practical Quantitation Limit (PQL) and the results are considered acceptable.

E. Field Blanks:

E.1 All QC criteria for the field blank analysis were met and the results are considered acceptable.

F. Laboratory Control Sample Analysis:

F.1 The laboratory control sample QC criteria were met for all "blank spike" analyses and the results are considered acceptable.

G. Field Duplicate Analysis:

G.1 No field duplicate analysis is included in the project documentation.

H. Surrogate Recoveries:

H.1 All surrogate recoveries met applicable QC criteria and the results are considered acceptable.

I. Matrix Spike/Matrix Spike Duplicate Analyses:

I.1 The matrix spike (MS) and matrix spike duplicate (MSD) analyses associated with these samples met all applicable QC criteria and the results are considered acceptable.

J. Internal Standards:

J.1 Internal standard areas for all sample analyses were within specified QC criteria and the results are considered acceptable.

K. Quantitation and Identification:

K.1 No problems were observed with sample quantitation and identification with project sample analyses.

L. Conclusion:

L.1 All data are considered valid and usable for all purposes.

ICF KAISER ENGINEERS

ICF Kaiser Engineers, Inc.
1800 Harrison Street
P.O. Box 23210
Oakland, California 94612-3430
510/419-6000 FAX 510/419-5355

DATA VALIDATION REPORT

PROGRAM:	Elmendorf AFB/Point Barrow RI/FS (ICF Project No.41096-412-02)
LABORATORY:	Commercial Testing & Engineering Co. (Anchorage, AK)
REVIEWER:	Cynthia E. Schlag
ANALYSIS:	BTEX Compounds by USEPA Method 8020
MATRIX:	Soil
DATE:	February 22, 1994 (revised May 19, 1994)

I. INTRODUCTION:

Commercial Testing & Engineering Co. (CT&E) (Anchorage, AK) received one (1) soil sample for BTEX (benzene, toluene, ethylbenzene, and xylenes) analysis by USEPA Method 8020 on September 6, 1993. The sample was analyzed for BTEX by gas chromatography with photo-ionization detection (GC/FID) on September 17, 1993.

The ICF site identification number and corresponding CT&E laboratory sample identification number are listed below.

ICF Site No.	Lab Sample No.
BRW-SS01-2S07	93.4627-05

There were no QC sample designations included in project documentation.

It should be noted, that all quantitation limits reported by the laboratory for project soil samples were higher than those specified in the Project Sampling and Analysis Plan for USEPA Method 8020. According to the laboratory, all soil samples were extracted in methanol before analysis, as required by State of Alaska guidelines. It is the opinion of the reviewer that the quality of the data was not affected.

The analytical results for project soil samples were reported with an adjustment for moisture content.

The analytical results with qualifications are presented on modified sample data sheets submitted by the laboratory. Definitions of the data qualifiers are listed in Table 1B. This report was prepared in accordance with the USEPA draft document "National Functional Guidelines for Organic Data Review", (December 1990) USEPA Method 8020 and the Project Sampling and Analysis Plan.

II. **VALIDITY & COMMENTS:**

A. Technical Holding Times:
A.1 The technical holding time QC criteria were met for the project sample.

B. Initial Calibration:
B.1 All QC criteria for the initial calibration were met and the results are considered acceptable.

C. Continuing Calibration:
C.1 All QC criteria for the continuing calibration were met and the results are considered acceptable.

D. Laboratory Blanks:
D.1 No target analytes were detected in the method blanks at a concentration above the practical quantitation limit (PQL) and the results are considered acceptable.

E. Field Blanks:
E.1 No field blank analysis is included in the project documentation.

F. Field Duplicate Analysis:
F.1 No field duplicate analysis is included in the project documentation.

G. Laboratory Control Sample Analysis:
G.1 The laboratory control sample QC criteria were met for all "blank spike" analyses and the results are considered acceptable.

H. Surrogate Recoveries:
H.1 All surrogate recoveries met applicable QC criteria and the results are considered acceptable.

I. Matrix Spike/Matrix Spike Duplicate Analyses:
I.1 The matrix spike (MS) and matrix spike duplicate (MSD) analyses met all QC criteria and the results are considered acceptable.

J. Internal Standards:
J.1 Internal standard areas for all sample analyses were within specified QC criteria and the results are considered acceptable.

K. Quantitation & Identification:
K.1 Due to analyte identification problems, the following analytes are considered to be presumptively present (N) and the detected results are usable for limited purposes only (see modified sample data sheets):

- toluene, ethylbenzene, p&m-xylene, and o-xylene in sample number BRW-SS01-2S07

The laboratory did not confirm all detected results by using a secondary column or GC/MS analysis. The results for the samples listed above are considered to be tentatively identified and qualitatively questionable.

K.2 No other problems were observed with sample quantitation and identification in project sample analysis.

L. Conclusion:

L.1 Due to the lack of confirmation, select data are considered to be tentatively identified and qualitatively questionable.

L.2 All other data are considered valid and usable for all purposes.

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DATA VALIDATION REPORT

PROGRAM:	Dewline/Point Barrow RI/FS (ICF Project No.41096-412-02)
LABORATORY:	Commercial Testing & Engineering Co. (Anchorage, AK)
REVIEWER:	Cynthia Schlag, ICF Kaiser Engineers
ANALYSIS:	Volatile Organic Compounds by USEPA Method 8260
MATRIX:	Water and Soil
DATE:	February 23, 1994 (revised May 19, 1994)

I. INTRODUCTION:

Commercial Testing & Engineering Co. (Anchorage, AK) received five (5) soils and eight (8) water samples for volatile organic compounds (VOC) analyses by USEPA Method 8260 on August 26 and 27, and September 6, 1993. The samples were analyzed for VOCs by gas chromatography/mass spectrometry (GC/MS) on September 3, 5, 9, 14, and 23, 1993.

The ICF site identification numbers and corresponding Commercial Testing & Engineering Co. sample identification numbers are listed below.

ICF Site No.	Lab Sample No.	Matrix
BRW-TB-01	93.4395-01	Water
BRW-AB-01	93.4395-02	Water
BRW-BKGD-SW01	93.4395-03	Water
BRW-AOC2-SW04	93.4395-07	Water
BRW-AOC2-SW08	93.4395-09	Water
BRW-BKGD-SD01	93.4397-01	Soil
BRW-BKGD-S01	93.4397-04	Soil
BRW-AOC2-SD07	93.4397-08	Soil
BRW-AOC2-S04	93.4424-01	Soil
BRW-EB-01	93.4424-04	Water
BRW-SS02-2S06	93.4627-01	Soil
BRW-2TB-03	93.4627-22	Water
BRW-2EB-02	93.4627-23	Water

The following QC sample designations were included in project documentation: sample numbers BRW-TB-01 and BRW-2TB-03 were designated as "trip blanks;" sample numbers BRW-EB-01 and BRW-2EB-02 were designated as "equipment blanks;" sample number BRW-AB-01 was designated as an "ambient blank;" and sample numbers BRW-AOC2-SW04 and BRW-AOC2-SW08 were designated as a "field duplicate pair."

Soil sample results and quantitation limits were reported by the laboratory with an adjustment for moisture content.

Although, sample numbers BRW-BKGD-S01 and BRW-AOC2-SD07 were requested to be validated. the samples were not analyzed by the laboratory due to exceeded technical holding times.

It should be noted, that all quantitation limits reported by the laboratory for project soil samples were higher than those specified in the Project Sampling and Analysis Plan for USEPA Method 8260. According to the laboratory, all soil samples were extracted in methanol before analysis, as required by State of Alaska guidelines. It is the opinion of the reviewer that the quality of the data was not affected.

The analytical results with qualifications are presented on modified sample data sheets included in the report appendix. Definitions of data qualifiers are provided in Table 1B. This report was prepared according to the USEPA draft document "National Functional Guidelines for Organic Data Review" (December 1990), USEPA SW-846 Method 8260, and the Project Sampling and Analysis Plan.

II. VALIDITY and COMMENTS:

A. Technical Holding Times:

A.1 Sample numbers BRW-BKGD-SD01 and BRW-SS02-2S06 exceeded technical holding time criteria of 14 days by 5 and 2 days, respectively. Therefore, all analytical sample results for the above noted sample are considered estimated (J) and usable for limited purposes only (see modified sample data sheets).

A.2 Technical holding time QC criteria were met for all other project sample analyses.

B. GC/MS Instrument Performance Check:

B.1 All QC criteria for the bromofluorobenzene (BFB) tunes were met and the results are considered acceptable.

C. Initial Calibration:

C.1 All QC criteria for the initial calibration were met and the results are considered acceptable.

D. Continuing Calibration:

D.1 All QC criteria for the continuing calibration were met and the results are considered acceptable.

E. Laboratory Blanks:

E.1 No target analytes were detected in the method blank at concentrations above the Practical Quantitation Limits (PQL) and the results are considered acceptable.

F. Surrogate Recoveries:

F.1 All surrogate recoveries met applicable QC criteria and the results are considered acceptable.

G. Field Blanks:

G.1 The following target analyte was detected in the field blanks listed below at concentrations above the PQL:

Sample No.	Analyte	Concentration
BRW-2EB-02	Methylene chloride	0.0060 mg/L
BRW-2TB-03	Methylene chloride	0.0038 mg/L

Methylene chloride was not detected in the associated sample. Therefore, no target analytes were qualified based on the field blank contamination noted above.

G.2 No other target analytes were detected in the field blanks at concentrations above the PQL and the results are considered acceptable.

H. Laboratory Control Sample Analysis:

H.1 Laboratory control sample QC criteria were met for all "blank spike" analyses and the results are considered acceptable.

I. Laboratory Replicate Analysis:

I.1 Sample number BRW-TB-01 was utilized for laboratory replicate analyses. All QC criteria were met and the results are considered acceptable.

J. Field Duplicate Analysis:

J.1 A QC limit for precision of $\leq$20%, as measured by the Relative Percent Difference (RPD) between sample values, was specified for field duplicate comparability.

Sample numbers BRW-AOC2-SW04 and BRW-AOC2-SW08 were utilized for the field duplicate analysis. An RPD value of 100% was reported for naphthalene and 1,2-dichloroethane, exceeding the QC criteria of $\leq$20%. Therefore, naphthalene and 1,2-dichloroethane, for the above noted samples, are considered estimated (J) and usable for limited purposes only (see modified sample data sheets).

K. Matrix Spike/Matrix Spike Duplicate Analysis:

K.1 The recoveries of 1,1-Dichloroethane in the matrix spike (MS) and matrix spike duplicate (MSD) analyses associated with some soil samples did not meet the laboratory established QC limits as noted below.

Sample No.	% Recovery	QC Limits
BRW-BKGD-SD01 MS	15	80-120%
BRW-BKGD-SD01 MSD	17	80-120%
BRW-AOC2-S04 MS	19	80-120%
BRW-AOC2-S04 MSD	17	80-120%
BRW-AOC2-2S09 MS	57	80-120%
BRW-AOC2-2S09 MSD	64	80-120%

According to USEPA data validation guidelines, organic data are not qualified based on MS/MSD QC outliers alone. It is the opinion of the reviewer that the low recoveries in these samples are due to sample matrix interferences, and the affect on the quality of the data is not known.

L. Internal Standards:

L.1 Internal standard areas for all sample analyses were within specified QC criteria and the results are considered acceptable.

M. Quantitation and Identification:

M.1 No problems were observed with analyte quantitation and identification in project sample analyses.

N. Conclusion:

N.1 Due to deficiencies in the field duplicate analyses and the technical holding times, select data are considered estimated and usable for limited purposes only.

N.2 All other data are considered valid and usable for all purposes.

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DATA VALIDATION REPORT

PROGRAM:	Dewline/Point Barrow RI/FS (ICF Project No. 41096-412-02)
LABORATORY:	Commercial Testing & Engineering Co. (Anchorage, AK)
REVIEWER:	Cynthia Schlag, ICF Kaiser Engineers
ANALYSIS:	Semivolatile Organic Compounds by USEPA Method 8270
MATRIX:	Soil and Water
DATE:	February 22, 1994

I. INTRODUCTION:

Commercial Testing & Engineering Co. (Anchorage, AK) received four (4) soil samples and three (3) water samples for semivolatile organic compound (SVOC) analyses by USEPA Method 8270 on August 26 and 27, 1993. The water samples were extracted on September 1, 2, and 10, 1993 and analyzed for SVOCs by gas chromatography/mass spectrometry (GC/MS) on September 5, 11, and 24, 1993. The soil samples were extracted on September 9, 1993 and analyzed for SVOCs by GC/MS on October 9, 1993.

The ICF site identification numbers and corresponding Commercial Testing & Engineering Co. sample identification numbers are listed below.

ICF Site No.	Lab Sample No.	Matrix
BRW-BKGD-SW01	93.4395-03	Water
BRW-AOC2-SW04	93.4396-01	Water
BRW-BKGD-SD01	93.4397-01	Soil
BRW-BKGD-S01	93.4397-04	Soil
BRW-AOC2-SD07	93.4397-08	Soil
BRW-AOC2-S04	93.4424-01	Soil
BRW-EB-01	93.4424-04	Water

The following QC sample designations were included in project documentation: sample number BRW-EB-01 was designated as an "equipment blank." However, sample number BRW-EB-01 was not analyzed by the laboratory due to exceeded holding time.

Soil sample results and quantitation limits were reported by the laboratory with an adjustment for moisture content.

Laboratory reports for matrix spike (MS) and matrix spike duplicate (MSD) analyses associated with some project samples were not included with the data package. Therefore, the corresponding ICF sample numbers could not be determined and the laboratory sample numbers were referenced in comments F.2 and K.2 instead.

The analytical results with qualifications are presented on modified sample data sheets included in the report appendix. Definitions of data qualifiers are provided in Table 1B. This report was prepared according to the USEPA draft document "National Functional Guidelines for Organic Data Review" (December 1990), USEPA SW-846 Method 8270, and the Project Sampling and Analysis Plan.

II. VALIDITY and COMMENTS:

A. Technical Holding Times:

A.1 Technical holding time QC criteria were met for all project sample analyses.

B. GC/MS Instrument Performance Check:

B.1 All QC criteria for the decafluorotriphenylphosphine (DFTPP) tunes were met and the results are considered acceptable.

C. Initial Calibration:

C.1 All QC criteria for the initial calibration were met and the results are considered acceptable.

D. Continuing Calibration:

D.1 The percent differences (%Ds) in the continuing calibrations exceeded the $\leq \pm 25\%$ QC validation criteria for several analytes in the continuing calibrations performed on September 4, 5, and October 11, 1993. The detected results and quantitation limits for the analytes listed on Table A are considered estimated (J) and usable for limited purposes only (see modified sample data sheets and Table A).

E. Laboratory Blanks:

E.1 Target analyte di-n-butylphthalate was detected in the soil method blank at a concentration above the Practical Quantitation Limit (PQL):

Date extracted	Analyte	Concentration
09/09/93	di-n-butylphthalate	0.310 mg/Kg
09/10/93	di-n-butylphthalate	1.61 mg/Kg

Due to method blank contamination, the result reported for di-n-butylphthalate in sample number BRW-AOC2-S04 is considered non-detected (U) (see modified sample data sheets).

E.2 No other target analytes were detected in the method blanks at concentrations above the PQL and the results are considered acceptable.

F. Surrogate Recoveries:

F.1 All acid fraction surrogate recoveries for sample number BRW-BKGD-SW01 were below the 10% QC validation criteria and all the base/neutral surrogate recoveries were above 10% but below acceptable QC limits. Therefore, the quantitation limits for all acid fraction target analytes in sample number BRW-BKGD-SW01 are considered rejected (R) and unusable for any purpose and all base/neutral target analytes in sample number BRW-BKGD-SW01 are considered estimated (J) and usable for limited purposes only (see modified sample data sheets).

F.2 The following percent surrogate recoveries for the water method blank extracted on 09/02/93 were outside method QC limits:

Sample No.	Analyte	Recovery	QC criteria
MB 09/02/93	nitrobenzene-d5	34%	35-114%
MB 09/02/93	2-fluorobiphenyl	34%	43-116%

Due to the above noted surrogate recovery problem, the base/neutral target analytes in the method blank extracted on 09/02/93 are considered estimated (J) and usable for limited purposes only (see modified sample data sheets).

F.3 The following percent recoveries for 93.4358-02 MS were outside method QC limits:

Sample No.	Analyte	Recovery	QC criteria
93.4358-02 MS	2-fluorophenol	19%	21-110%
93.4358-02 MS	2-fluorobiphenyl	37%	43-116%

Although the above listed surrogate recoveries did not meet the QC limits in sample number 93.4358-02 MS, no data are qualified based on USEPA validation guidelines.

F.4 All surrogate recoveries for sample number BRW-AOC2-S04 MSD were below the 10% QC validation criteria due to sample loss during extraction and this should be noted.

F.5 All other surrogate recoveries met applicable QC criteria and the results are considered acceptable.

G. Field Blanks:

G.1 No field blank analysis is included with the project documentation.

H. Laboratory Control Sample Analysis:

H.1 Laboratory control sample QC criteria were met for all other "blank spike" analyses and the results are considered acceptable.

I. Laboratory Replicate Analysis:

I.1 No laboratory replicate analysis is included with the project documentation.

J. Field Duplicate Analysis:

J.1 No field duplicate analysis is included with project documentation.

K. Matrix Spike/Matrix Spike Duplicate Analysis:

K.1 All spiked analytes for sample number BRW-AOC2-S04 MSD had no recoveries due to sample loss during the extraction process and this should be noted.

K.2 The MS/MSD recoveries in sample numbers 93.4358-02 MS, 93.4358-03 MSD, and 93.4397-02 MS did not meet the QC criteria as noted below.

Sample No.	Compound	Recovery	QC Limits
93.4358-02 MS	1,2,4-trichlorobenzene	39%	44-142%
93.4358-02 MS	acenapthene	45%	47-145%
93.4358-02 MS	pentachlorophenol	12%	14-176%
93.4358-03 MSD	pentachlorophenol	11%	14-176%
93.4397-02 MS	pentachlorophenol	14%	17-109%

According to USEPA guidelines, organic data are not qualified based on MS/MSD recoveries alone. It is the opinion of the reviewer that the recoveries in these samples are due to sample matrix interferences and the affect on the quality of the data is not known.

K.3 All other MS and MSD analyses met the QC criteria and are considered acceptable.

L. Internal Standards:

L.1 Internal standard areas for all analyses met applicable QC criteria and the results are considered acceptable.

M. Quantitation and Identification:

M.1 No problems were observed with analyte quantitation and identification in project sample analyses.

N. Conclusion:

N.1 Due to the above noted low surrogate recoveries, select data are considered rejected and unusable for any purposes.

N.2 Due to the above noted deficiencies in continuing calibration performance and laboratory blank contamination, select data are considered as estimates and usable for limited purposes only.

N.3 Due to the above noted laboratory blank contamination, select data are considered non-detected.

N.4 All other data are considered valid and usable for all purposes.

TABLE A CALIBRATIONS OUTSIDE %D CRITERIA			
Date	**Compound**	**%D**	**Samples**
Continuing Calibration - September 4, 1993	3,3'-dichlorobenzidine indeno(1,2,3-cd)pyrene	36.2 37.5	blank(aq)
Continuing Calibration - September 5, 1993	3,3'-dichlorobenzidine	26.2	BRW-AOC2-SW04
Continuing Calibration - October 11, 1993	hexachlorocyclopentadiene	27.9	BRW-AOC2-S04

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DATA VALIDATION REPORT

PROGRAM:	Elmendorf AFB/Point Barrow RI/FS (ICF Project No. 41096-412-02)
LABORATORY:	Commercial Testing & Engineering Co. (Anchorage, AK)
REVIEWER:	Cynthia Schlag
ANALYSIS:	Total Organic Carbon by USEPA Method 9060
MATRIX:	Water and Soil
DATE:	February 22, 1994 (revised May 19, 1994)

I. INTRODUCTION:

Commercial Testing & Engineering Co. (CT&E) (Anchorage, AK) received two (2) water samples and four (4) soil samples for Total Organic Carbon (TOC) analysis by USEPA Method 9060 on August 26 and 27, 1993. The water samples were analyzed by CT&E and the soil samples were analyzed by Twiss Analytical for TOC on September 8, 23, and 24, 1993.

The ICF site identification numbers and corresponding CT&E laboratory sample identification numbers are listed below.

ICF Site No.	Lab Sample No.	Matrix
BRW-BKGD-SW01	93.4395-03	Water
BRW-AOC2-SW04	93.4396-01	Water
BRW-BKGD-SD01	93.4397-01	Soil
BRW-BKGD-S01	93.4397-04	Soil
BRW-AOC2-SD07	93.4397-08	Soil
BRW-AOC2-S04	93.4424-01	Soil

There was no QC sample designation included in project documentation.

Soil sample results and quantitation limits were reported by the laboratory with an adjustment for moisture content.

The analytical results with qualifications are presented on modified sample data sheets submitted by the laboratory. Definitions of the data qualifiers are listed in Table 1B. This report was prepared in accordance with the USEPA draft document "Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analysis" (October 1989), USEPA Method 9060 and the Project Sampling and Analysis Plan.

II. VALIDITY & COMMENTS:

A. Technical Holding Times:

A.1 Technical holding time QC criteria were met for all project samples.

B. Initial Calibrations:

B.1 The laboratory did not use multi-level calibration standards to quantitate values for the soil samples, as specified by the method. However, the single calibration standard used was within a reasonable range for accurate quantitation. Therefore, it is the opinion of the reviewer that the quality of the data is not affected and the results are considered acceptable.

B.2 All initial calibration criteria were met for all project water sample analyses and the results are considered acceptable.

C. Laboratory Blanks:

C.1 The target analyte was not detected in the method blanks at a concentration above the Practical Quantitation Limit (PQL) and the results are considered acceptable.

D. Field Blanks:

D.1 No field blank analysis is included with the project documentation.

E. Laboratory Control Sample Analysis:

E.1 The laboratory control sample QC criteria were met for all "blank spike" analyses and the results are considered acceptable.

F. Laboratory Replicate Analysis:

F.1 No laboratory replicate analysis is included with the project documentation.

G. Field Duplicate Analysis:

G.1 No field duplicate analysis is included with the project documentation.

H. Matrix Spike:

H.1 The water matrix spike recovery met all applicable QC criteria and the results are considered acceptable.

H.2 No soil matrix spike is included with the project documentation, therefore, the quality of the data cannot be determined.

I. Quantitation:

I.1 Although a single-point calibration standard was used to quantitate sample results, the quality of the data are not affected and the results are considered acceptable.

I.2 No problems were encountered with sample quantitation and the results are considered acceptable.

J. Conclusion:

J.1 All data are considered valid and usable for all purposes.

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DATA VALIDATION REPORT

PROGRAM: Elmendorf AFB/Point Barrow RI/FS (ICF Project No. 41096-412-02)
LABORATORY: Commercial Testing & Engineering Co. (Anchorage, AK)
REVIEWER: Sharon Lin, ICF Kaiser Engineers, Inc.
ANALYSIS: Total Dissolved Solids by USEPA Method 160.1
MATRIX: Water
DATE: February 18, 1994 (revised May 19, 1994)

I. INTRODUCTION:

Commercial Testing & Engineering Co. (CT&E) (Anchorage, AK) received one (1) water sample for Total Dissolved Solids (TDS) analysis by USEPA Method 160.1 on August 28, 1993. The sample was analyzed for TDS on September 7, 1993.

The ICF site identification number and corresponding CT&E laboratory sample identification number are listed below.

ICF Site No.	Lab Sample No.
BRW-BKGD-SW01	4395-3

The analytical results with qualifications are presented on modified sample data sheet included in the report appendix. Definitions of data qualifiers are listed in Table 1B. This report was prepared in accordance with the USEPA draft document "Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analysis," October 1989, USEPA Method 160.1 and the Project Sampling and Analysis Plan.

II. VALIDITY & COMMENTS:

A. Technical Holding Times:

A.1 The project sample was collected on August 26, 1993 and was analyzed for TDS on September 7, 1993, exceeding the technical holding time QC criteria of seven (7) days by five (5) days. Therefore, the detected result for the project sample is considered as an estimate (J) and usable for limited purposes only (see modified sample data sheet).

B. Calibration:

B.1 All applicable QC criteria were met for sample calibration analyses and the results are considered acceptable.

C. Laboratory Blanks:

C.1 TDS was not detected in the method blank at a concentration above the Practical Quantitation Limit (PQL) and the results are considered acceptable.

D. Field Blanks:

D.1 There were no field blank analyses associated with the project samples.

E. Laboratory Replicate Analyses:

E.1 Laboratory replicate analyses submitted with project data met all applicable QC criteria for precision as measured by Relative Percent Difference (RPD) and the results are considered acceptable.

F. Field Duplicate Analysis:

F.1 There were no field duplicate analyses associated with the project samples.

G. Quantitation:

G.1 No problems were encountered with sample quantitation.

H. Conclusion:

H.1 Due to the exceeded holding time, the sample result is considered estimated and usable for limited purposes only.

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DATA VALIDATION REPORT

PROGRAM:	Elmendorf AFB/Point Barrow RI/FS (ICF Project No. 41096-412-02)
LABORATORY:	Commercial Testing & Engineering Co. (Anchorage, AK)
REVIEWER:	Sharon Lin, ICF Kaiser Engineers, Inc.
ANALYSIS:	Total Suspended Solids by USEPA Method 160.2
MATRIX:	Water
DATE:	February 18, 1994 (revised May 19, 1994)

I. INTRODUCTION:

Commercial Testing & Engineering Co. (CT&E) (Anchorage, AK) received one (1) water sample for Total Suspended Solids (TSS) analysis by USEPA Method 160.2 on August 28, 1993. The sample was analyzed for TSS on September 2, 1993.

The ICF site identification number and corresponding CT&E laboratory sample identification number are listed below.

ICF Site No.	Lab Sample No.
BRW-BKGD-SW01	4395-3

The analytical results are presented on the sample data sheet submitted by the laboratory (definitions of data qualifiers are listed in Table 1B). This report was prepared in accordance with the USEPA draft document "Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analysis," October 1989, USEPA Method 160.2 and the Project Sampling and Analysis Plan.

II. VALIDITY & COMMENTS:

A. Technical Holding Times:

A.1 All technical holding time QC criteria were met for project sample analyses.

B. Calibration:

B.1 Method calibration is not a requirement for USEPA Method 160.2.

C. Laboratory Blanks:

C.1 TSS was not detected in the method blank associated with the project sample at a concentration above the Practical Quantitation Limit (PQL) and the results are considered acceptable.

D. Field Blanks:

D.1 There were no field blanks analyses associated with the project samples.

E. Laboratory Replicate Analyses:

E.1 Laboratory replicate analyses submitted with project data met all applicable QC criteria for precision as measured by Relative Percent Difference (RPD) and the results are considered acceptable.

F. Field Duplicate Analyses:

F.1 There were no field duplicate analyses associated with the project samples.

G. Quantitation:

G.1 No problems were encountered with sample quantitation.

H. Conclusion:

H.1 All data are considered valid and usable for all purposes.

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DATA VALIDATION REPORT

PROGRAM:	Elmendorf AFB/Point Barrow RI/FS (ICF Project No. 41096-412-02)
LABORATORY:	Commercial Testing & Engineering Co. (Anchorage, AK)
REVIEWER:	Cynthia E. Schlag, ICF Kaiser Engineers, Inc.
ANALYSIS:	Total Suspended Solids by USEPA Method 160.2
MATRIX:	Water
DATE:	February 18, 1994 (revised May 19, 1994)

I. INTRODUCTION:

Commercial Testing & Engineering Co. (CT&E) (Anchorage, AK) received one (1) water sample for Total Suspended Solids (TSS) analysis by USEPA Methods 160.2 on August 26, 1993. The samples were analyzed for TSS on August 31, 1993.

The ICF site identification number and corresponding CT&E laboratory sample identification number is listed below.

ICF Site No.	Lab Sample No.
BRW-AOC2-SW04	93.4396-01

There were no QC sample designations in the project documentation.

The analytical results with qualifications are presented on modified sample data sheets submitted by the laboratory. Definitions of data qualifiers are provided in Table 1B. This report was prepared in accordance with the USEPA draft document "Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analysis," October 1989, USEPA Method 160.2, and the Project Sampling and Analysis Plan.

II. VALIDITY and COMMENTS:

A. Technical Holding Times:

A.1 Technical holding time QC criteria were met for all project sample analyses.

B. Initial Calibration:

B.1 Method calibration is not a requirement of USEPA Method 160.2.

C. Laboratory Blanks:

C.1 TSS was not detected in the method blank at a concentration above the Practical Quantitation Limit (PQL) and the results are considered acceptable.

D. Field Blanks:
D.1 No field blank analysis is included with the project documentation.

E. Field Duplicate Analysis:
E.1 No field duplicate analyses are included in the project documentation.

F. Laboratory Replicate Analysis:
F.1 A QC limit for precision of $\leq$20%, as measured by the Relative Percent Difference (RPD) between sample values, was specified for field duplicate replicate comparability.

Sample number BRW-AOC2-SW04 was utilized for laboratory replicate analysis. The results of the field replicate analysis met all applicable QC criteria and the results are considered acceptable.

G. Quantitation:
G.1 No problems were observed with analyte quantitation in project sample analyses.

H. Conclusion:
H.1 All data are considered valid and usable for all purposes.

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DATA VALIDATION REPORT

PROGRAM:	Elmendorf AFB/Point Barrow RI/FS (ICF Project No. 41096-412-02)
LABORATORY:	Commercial Testing & Engineering Co. (Anchorage, AK)
REVIEWER:	Sharon Lin, ICF Kaiser Engineers, Inc.
ANALYSIS:	Total and Dissolved Metals by USEPA Method 6010 & Total and Dissolved Thallium by USEPA Method 7841
MATRIX:	Soil & Water
DATE:	February 15, 1994 (revised May 19, 1994)

I. INTRODUCTION:

Commercial Testing & Engineering Co. (CT&E) (Anchorage, AK) received four (4) soil samples and two (2) water samples for total and dissolved metals analyses by USEPA Methods 6010 and 7841 on August 28 and 29, 1993. The samples were digested on August 30 through September 11, 1993 and were analyzed for total and dissolved metals by inductively coupled plasma atomic emission spectroscopy (ICP) and for total and dissolved thallium by atomic absorption furnace technique (GFAA) on August 31 through September 14, 1993.

The ICF site identification numbers and corresponding CT&E laboratory sample identification numbers are listed below.

ICF Site No.	Lab Sample No.	Matrix
BRW-AOC2-SW04	4396-1	Water
BRW-AOC2-SW04 (F)	4396-1	Water
BRW-BKGD-SD01	4397-1	Soil
BRW-BKGD-S01	4397-4	Soil
BRW-BKGD-SD07	4397-8	Soil
BRW-AOC2-S04	4424-1	Soil
BRW-EB01	4424-4	Water

Sample number BRW-EB01 was designated as an "equipment blank."

Sample number BRW-AOC2-SW04 (F) was designated as a field-filtered sample and analyzed for dissolved metals and thallium.

The analytical results with qualifications are presented on modified sample data sheets included in the report appendix. Definitions of data qualifiers are provided in Table 1B. This report was prepared according

to the USEPA draft document "Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analysis," October 1989, USEPA Method 6010, USEPA Method 7841, and the Project Sampling and Analysis Plan.

II. VALIDITY and COMMENTS:

A. Technical Holding Times:

A.1 Technical holding time QC criteria were met for all project sample analyses.

B. Initial Calibration:

B.1 Initial calibration QC criteria were met for project sample analyses and the results are considered acceptable.

C. Continuing Calibrations:

C.1 Continuing calibration QC criteria were met for project sample analyses and the results are considered acceptable.

D. Laboratory Blank Analyses:

D.1 No target analytes were detected in the method and calibration blanks (initial and continuing calibration blanks) above the Practical Quantitation Limit (PQL) and the results are considered acceptable.

E. Field Blanks:

E.1 Target analyte calcium was detected in equipment blank BRW-EB01 at a concentration of 0.22 mg/L. However, the reported calcium result in the associated sample exceeded the equipment blank result by a factor of greater than ten (10), therefore, no adverse effect on data quality is expected.

E.2 No other target analytes were detected above the PQL in the above noted equipment blank and the results are considered acceptable.

F. Field Duplicate Analysis:

F.1 There were no field duplicate analyses included in the project documentation.

G. Laboratory Replicate Analysis:

G.1 Sample number BRW-AOC2-S04 was utilized for laboratory replicate analysis associated with sample numbers BRW-AOC2-S04 and BRW-EB01. All QC criteria for laboratory replicate analysis were met and the results are considered acceptable.

G.2 There were no laboratory replicate analysis performed for other project samples.

H. ICP Interference Check Sample (ICS) Analyses:

H.1 All applicable QC criteria were met for the ICS analyses and the results are considered acceptable.

I. Laboratory Control Sample (LCS) Analyses:

I.1 All LCS analyses associated with project samples met applicable QC criteria and the results are considered acceptable.

J. Matrix Spike (MS) Analysis:

J.1 The MS recoveries for the following sample analytes were outside the advisory QC limits of 75-125%:

Associated Sample	Analyte	% Recovery	Bias
BRW-BKGD-SD01	Silver	53	Low
BRW-BKGD-S01	Silver	53	Low
BRW-AOC2-SD07	Silver	53	Low
BRW-AOC2-S04	Silver	54	Low
BRW-EB01	Silver	54	Low
BRW-AOC2-S04	Calcium	146	High
BRW-AOC2-S04	Magnesium	151	High

Due to the above noted deviations in MS recoveries, all detected results and sample quantitation limits for the above noted analytes are considered as estimates (J) and usable for limited purposes only (see modified sample data sheets).

The non-detected results for silver in sample numbers BRW-BKGD-SD01, BRW-BKGD-S01, BRW-AOC2-SD07, BRW-AOC2-S04 and BRW-EB01 may be false negatives.

The detected results for calcium and magnesium in sample number BRW-AOC2-S04 may be biased high.

J.2 Due to above noted deviations in MS recoveries, post-digestion spike recovery analyses were performed on September 2, 6 and 10, 1993. The recovery results for all post-digestion spike analyses met applicable QC criteria.

J.3 All other applicable QC criteria were met for the MS analyses and the results are considered acceptable.

K. Quantitation:

K.1 No problems were observed with analyte quantitation in project sample analyses.

L. Conclusion:

L.1 Due to above noted deficiencies in matrix spike analyses, select data are considered estimates and usable for limited purposes.

L.2 All other data are considered valid and usable for all purposes.

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DATA VALIDATION REPORT

PROGRAM: Elmendorf AFB/Point Barrow RI/FS (ICF Project No. 41096-412-02)
LABORATORY: Commercial Testing & Engineering Co. (Anchorage, AK)
REVIEWER: Sharon Lin, ICF Kaiser Engineers, Inc.
ANALYSIS: Total and Dissolved Metals by USEPA Method 6010 & Total and Dissolved Thallium by USEPA Method 7841
MATRIX: Water
DATE: February 17, 1994 (revised May 19, 1994)

I. INTRODUCTION:

Commercial Testing & Engineering Co. (CT&E) (Anchorage, AK) received one (1) water sample for total and dissolved metals analyses by USEPA Methods 6010 and 7841 on August 28, 1993. The sample was digested on September 6, 1993 and was analyzed for total and dissolved metals by inductively coupled plasma atomic emission spectroscopy (ICP) and for total and dissolved thallium by atomic absorption furnace technique (GFAA) on September 8 and 10, 1993.

The ICF site identification numbers and corresponding CT&E laboratory sample identification numbers are listed below.

ICF Site No.	Lab Sample No.	Matrix
BRW-BKGD-SW01	4395-3	Water
BRW-BKGD-SW01 (F)	4395-3	Water

Sample number BRW-BKGD-SW01 (F) was designated as a field-filtered sample and analyzed for dissolved metals and thallium.

The analytical results with qualifications are presented on modified sample data sheets included in the report appendix. Definitions of data qualifiers are provided in Table 1B. This report was prepared according to the USEPA draft document "Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analysis," October 1989, USEPA Method 6010, USEPA Method 7841, and the Project Sampling and Analysis Plan.

II. VALIDITY and COMMENTS:

A. Technical Holding Times:

A.1 Technical holding time QC criteria were met for all project sample analyses.

B. Initial Calibration:

B.1 Initial calibration QC criteria were met for project sample analyses and the results are considered acceptable.

C. Continuing Calibrations:

C.1 Continuing calibration QC criteria were met for project sample analyses and the results are considered acceptable.

D. Laboratory Blank Analyses:

D.1 No target analytes were detected in the method and calibration blanks (initial and continuing calibration blanks) above the Practical Quantitation Limit (PQL) and the results are considered acceptable.

E. Field Blanks:

E.1 There were no field blank analyses included in the project documentation.

F. Field Duplicate Analysis:

F.1 There were no field duplicate analyses included in the project documentation.

G. Laboratory Replicate Analysis:

G.1 Sample number BRW-BKGD-SW01 was utilized for laboratory replicate analysis. All QC criteria for laboratory replicate analysis were met and the results are considered acceptable.

H. ICP Interference Check Sample (ICS) Analyses:

H.1 All applicable QC criteria were met for the ICS analyses and the results are considered acceptable.

I. Laboratory Control Sample (LCS) Analyses:

I.1 All LCS analyses associated with project samples met applicable QC criteria and the results are considered acceptable.

J. Matrix Spike (MS) Analysis:

J.1 Sample numbers BRW-BKGD-SW01 and BRW-BKGD-SW01 (F) were utilized for MS analyses. The MS recovery for sodium in sample BRW-BKGD-SW01(F)-MS was 61%, falling outside the advisory QC limits of 75-125%. Therefore, the detected result for sodium in sample number BRW-BKGD-SW01 (F) is considered as an estimate (J) and usable for limited purposes only. The above noted result may be biased low.

J.2 Due to above noted deviation in MS recovery, a post-digestion spike recovery analysis was performed on September 10, 1993. The recovery results for all post-digestion spike analyses met applicable QC criteria.

J.3 All other applicable QC criteria were met for the MS analyses and the results are considered acceptable.

K. Quantitation:

K.1 No problems were observed with analyte quantitation in project sample analyses.

L. Conclusion:

L.1 Due to above noted deficiency in matrix spike analyses, select data are considered estimates and usable for limited purposes.

L.2 All other data are considered valid and usable for all purposes.

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DATA VALIDATION REPORT

PROGRAM:	POINT BARROW / DEW Line RI/FS (ICF Project No. 41096-412-02)
LABORATORY:	Friedman & Bruya, Inc. (Seattle, WA)
REVIEWER:	Timothy Vonnahme
ANALYSIS:	Diesel by EPA Method 8015M
MATRIX:	Water
DATE:	March 30, 1994

I. INTRODUCTION:

Friedman & Bruya, Inc. (Seattle, WA) received 11 water samples from the Point Barrow site (referenced chain of custody record No. 552) on August 26, 1993. Two samples were requested for diesel analysis by the semivolatile organics extraction method described in Section 8 of the Project Sampling and Analysis Plan. The samples were analyzed for diesel by USEPA Method 8015M (modified) (GC/FID) on September 3, 1993.

The ICF site identification numbers and corresponding FBI laboratory sample identification numbers are listed below.

ICF Site No.	Lab Sample No.	Matrix
BRW-BKGD-SW01	778	Water
BRW-BKGD-SW02	784	Water

It should be noted that all quantitation limits reported by the laboratory (200 ppb) for project water samples were lower than those specified in the Project Sampling and Analysis Plan (500 ppb). The correct practical quantitation limits (PQLs) when employing the lowest usable calibration point (50 ppm) should be 2500 ppb.

The instrument Number-Sequence Date on the Summary Form for Sample BRW-BKGD-SW01 (778) and BRW-BKGD-SW02 (784) were inadvertently recorded by the laboratory as ICF6 09-03-93 instead of ICF-5 09-03-93.

The analytical results with qualifications are presented on modified sample data sheets

report was prepared in accordance with the USEPA draft document " National Functional Guidelines for Organic Data Review", December 1990, and the analytical guidelines in USEPA Method 8015M, and the Project Sampling and Analysis Plan.

II. VALIDITY & COMMENTS:

A. Technical Holding Times:

A.1 Technical Holding time QC criteria were met for all project sample analyses.

B. Initial Calibration:

B.1 The laboratory analyzed a 6 point initial calibration on GC #5 on 8/28/93. The attempted range of the initial calibration was from 10 ppm to 10,000 ppm. Due to low areas and interferences, the 10 ppm calibration standard was omitted from the calibration. A percent relative standard deviation (%RSD) of 41.6% was calculated using calibration factors determined from the initial 5 point calibration. The RSD of 41.6% exceeds the recommended QC criteria of 20.0%, due to the 50 ppm calibration standard containing interferences which produces an artificially high calibration factor. A %RSD of 9.8% was obtained using a range of 200 ppm to 10000 ppm. Since the initial calibration exceeds the recommended QC criteria of 20.0%, and the lowest usable calibration point in the initial calibration was 50 ppm, the detected results for diesel in all project samples are qualified "J" as estimated and usable for limited purposes, and all PQLs are raised to 2500 ug/L (ppb).

C. Continuing Calibration:

C.1 All QC criteria for the continuing calibrations were met and the results are considered acceptable.

D. Laboratory Blanks:

D.1 Diesel was not detected in the method blank associated with the samples at a concentration above the PQL, and the results are considered acceptable.

E. Instrument Blanks:

E.1 Diesel was not detected in the instrument blank at a concentration above the PQL, and the results are considered acceptable.

F. Field Blank:

F.1 There were no field blank submitted for analyses with the project sample set.

G. Field Duplicate Analysis:

G.1 No field duplicate samples were submitted for the diesel fraction.

H. Surrogate Recoveries:

H.1 A discrepancy exists between the surrogate recoveries reported by the laboratory and the surrogate recoveries calculated by the reviewer, as listed below.

ICF Site No.	Laboratory Results	Validator Results
BRW-BKGD-SW01	97%	106%
BRW-BKGD-SW02	77%	84%

H.2 The discrepancy is not expected to have an affect on the quality of the data because surrogate QC criteria were met.

I. Matrix Spike/Matrix Spike Duplicate:

I.1 The laboratory did not submit any matrix spike/matrix spike duplicate analyses with this project sample set.

J. System Performance:

J.1 The lowest point of the initial calibration (10 ppm) could not be achieved due to low sensitivity and interferences at the retention time window of diesel.

J.2 No other problems with system performance were observed for the project sample analyses.

K. Quantitation and Identification:

K.1 The laboratory reported incorrect PQLs (200 ppb) for diesel in all project samples. The 50 ppm calibration standard was the lowest point of the curve that was usable, therefore, the PQLs should have been reported as 2500 ppb. The PQLs have been adjusted by the validator in the data summary forms submitted by the laboratory.

L. Conclusion:

L.1 No diesel was detected in the method blank or samples. Due to the previously mentioned problems with the initial calibration, all PQLs for the method blank and all project samples were raised to 2500 ppb.

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DATA VALIDATION REPORT

PROGRAM:	POINT BARROW / DEW Line RI/FS (ICF Project No. 41096-412-02)
LABORATORY:	Friedman & Bruya, Inc. (Seattle, WA)
REVIEWER:	Timothy Vonnahme
ANALYSIS:	Diesel by EPA Method 8015M
MATRIX:	Water
DATE:	March 28, 1994

I. INTRODUCTION:

Friedman & Bruya, Inc. (Seattle, WA) received 7 water samples from the Point Barrow site (referenced chain of custody record No. 556) on August 27, 1993 for diesel analysis by the semivolatile organics extraction method described in Section 8 of the Project Sampling and Analysis Plan. The samples were analyzed for diesel by USEPA Method 8015M (modified) (GC/FID) on September 3, 1993.

The ICF site identification numbers and corresponding FBI laboratory sample identification numbers are listed below.

ICF Site No.	Lab Sample No.	Matrix
BRW-EB01	1156	Water
BRW-SS01-SW01	1160	Water
BRW-SS01-SW02	1164	Water
BRW-SS01-SW03	1168	Water
BRW-SS01-SW04	1172	Water
BRW-SS01-SW05	1176	Water
BRW-SS01-SW06	1180	Water

It should be noted that all quantitation limits reported by the laboratory for project water samples (200 ppb) were lower than those specified in the Project Sampling and Analysis Plan (500 ppb). The correct practical quantitation limits (PQLs) when employing the lowest usable calibration point (50 ppm) should be 2500 ppb.

The instrument Number-Sequence Date on the Summary Form for Sample BRW-EB-01 (1156) was inadvertently recorded as ICF6 09-03-93 instead of ICF-5 09-01-93.

The analytical results with qualifications are presented on modified sample data sheets submitted by the laboratory. Definitions of the data qualifiers are listed in Table 1B. This report was prepared in accordance with the USEPA draft document " National Functional Guidelines for Organic Data Review", December 1990, and the analytical guidelines in USEPA Method 8015M, and the Project Sampling and Analysis Plan.

II. VALIDITY & COMMENTS:

A. Technical Holding Times:

A.1 Technical Holding time QC-criteria were met for all project sample analyses.

B. Initial Calibration:

B.1 The laboratory analyzed a 6 point initial calibration on GC #5 on 8/28/93. The attempted range of the initial calibration was from 10 ppm to 10,000 ppm. Due to low areas and interferences, the 10 ppm calibration standard was omitted from the calibration. A percent relative standard deviation (%RSD) of 41.6% was calculated using calibration factors determined from the initial 5 point calibration. The RSD of 41.6% exceeds the recommended QC criteria of 20.0%, due to the 50 ppm calibration standard containing interferences which produces an artificially high calibration factor. A %RSD of 9.8% was obtained using a range of 200 ppm to 10000 ppm. Since the initial calibration exceeds the recommended QC criteria of 20.0%, and the lowest usable calibration point in the initial calibration was 50 ppm, the detected results for diesel in all project samples are qualified "J" as estimated and usable for limited purposes, and all PQLs are raised to 2500 ug/L (ppb).

C. Continuing Calibration:

C.1 The percent recovery of diesel in the 500 ppm continuing calibration standards associated with the samples are listed below:

File Name	Time/Date	%R	Criteria
098F0201	1047/9-2	46*	75-125
098F0601	1610/9-2	81	75-125
098F2101	1135/9-3	94	75-125
098F2301	1519/9-3	85	75-125
098F3101	2148/9-3	84	75-125

The method blank was quantitated against continuing calibration standard (098F0201). Since the percent recovery is outside the QC criteria, the PQL is qualified "J" as estimated and usable for limited purposes.

D. Laboratory Blanks:

D.1 Diesel was not detected in the method blank associated with the samples at a concentration above the PQL, and the results are considered acceptable.

E. Instrument Blanks:

E.1 Diesel was not detected in the instrument blanks at a concentration above the PQL, and the results are considered acceptable.

F. Field Blank:

F.1 Diesel was not detected in the equipment blank at a concentration above the PQL and the results are considered acceptable.

G. Field Duplicate Analysis:

G.1 No Field Duplicate Samples were submitted for the diesel fraction.

H. Surrogate Recoveries:

H.1 A discrepancy exists between the surrogate recoveries reported by the laboratory and the surrogate recoveries calculated by the reviewer, as listed below:

ICF Site No.	Laboratory	Validation	QC Criteria
BRW-EB01	100%	151%*	50-150%
BRW-SS01-SW01	91%	136%	50-150%
BRW-SS01-SW02	84%	106%	50-150%
BRW-SS01-SW03	84%	126%	50-150%
BRW-SS01-SW04	103%	155%*	50-150%
BRW-SS01-SW05	83%	126%	50-150%
BRW-SS01-SW06	103%	155%*	50-150%

H.2 The laboratory stated that the water samples are usually saturated with unspiked methylene chloride (10 mL) and then extracted with methylene chloride (20 mL) spiked with pentacosane for a surrogate. Since this first step was inadvertently left out, less than the normal 20 mL of methylene chloride was recovered after extraction, resulting in above average surrogate recoveries. The laboratory corrected for this concentration of the sample extract and reported the above values. It is the opinion of the reviewer that since no diesel was detected in the samples, the above surrogate recoveries that are outside the QC criteria are not expected to affect the quality of the data.

I. Matrix Spike/Matrix Spike Duplicate:

I.1 The laboratory did not perform any matrix spike/matrix spike duplicate analyses for the diesel fraction.

J. System Performance:

J.1 The lowest point of the initial calibration (10 ppm) could not be achieved due to low areas and interferences at the retention time window of diesel.

J.2 No other problems with system performance were observed for the project sample analyses.

K. Quantitation and Identification:

K.1 The laboratory reported incorrect PQLs (200 ppb) for diesel for all project samples. The lowest calibration standard that was usable was the 50 ppm, therefore,

the PQLs should have been reported as 2500 ppb. The PQLs have been adjusted by the validator in the data summary forms submitted by the laboratory.

L. Conclusion:

L.1 Due to the previously mentioned problems with the initial calibration and continuing calibrations, all PQLs for the method blank and all project samples are raised to 2500 ppb, and the PQL for the method blank is qualified "J" as estimated and usable for limited purposes.

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DATA VALIDATION REPORT

PROGRAM:	POINT BARROW / DEW Line RI/FS (ICF Project No. 41096-412-02)
LABORATORY:	Friedman & Bruya, Inc. (Seattle, WA)
REVIEWER:	Timothy Vonnahme
ANALYSIS:	Diesel by EPA Method 8015M
MATRIX:	Soil & Water
DATE:	April 1, 1994

I. INTRODUCTION:

Friedman & Bruya, Inc. (Seattle, WA) received 11 samples from the Point Barrow site on August 27, 1993 (referenced chain of custody record No. 558). Requested analyses were for diesel by the semivolatile organics extraction method described in Section 8 of the Project Sampling and Analysis Plan. The samples were analyzed for diesel by USEPA Method 8015M (modified) (GC/FID) on September 3, 1993.

The ICF site identification numbers and corresponding FBI laboratory sample identification numbers are listed below.

ICF Site No.	Lab Sample No.	Matrix
BRW-SS01-SD06	1190	Soil
BRW-SS01-SD07	1192	Soil
BRW-SS01-SD08	1194	Soil
BRW-SS01-SD09	1196	Soil
BRW-SS01-S01	1198	Soil
BRW-SS01-S02	1200	Soil
BRW-SS01-S03	1202	Soil
BRW-SS02-S04	1204	Soil
BRW-SS02-S05	1206	Soil
BRW-SS01-SW07	1208	Water
BRW-SS01-SW08 (Results not submitted)	1209	Water

The results for sample BRW-SS01-SW08 were not reported by the laboratory.

The following QC sample designations were included in project documentation: sample numbers BRW-SS02-S04 and BRW-SS02-S05 were designated as field replicates.

The analytical results for the soil samples were reported with an adjustment for moisture content.

It should be noted that all quantitation limits reported by the laboratory (200 ppb) for the water sample were lower than those specified in the Project Sampling and Analysis Plan (500 ppb). The correct practical quantitation limit (PQL) when employing the lowest usable calibration point (50 ppm) should be 2500 ppb.

The analytical results with qualifications are presented on modified sample data sheets submitted by the laboratory. Definitions of the data qualifiers are listed in Table 1B. This report was prepared in accordance with the USEPA draft document " National Functional Guidelines for Organic Data Review", December 1990, and the analytical guidelines in USEPA Method 8015M, and the Project Sampling and Analysis Plan.

II. VALIDITY & COMMENTS:

A. Technical Holding Times:

A.1 Technical Holding time QC criteria were met for all project sample analyses.

B. Initial Calibration:

B.1 The laboratory analyzed a 6 point initial calibration on GC instrument ICF5 on 8/28/93. The attempted range of the initial calibration was from 10 ppm to 10,000 ppm. Due to low sensitivity and interferences, the 10 ppm calibration standard was omitted from the calibration. A percent relative standard deviation (%RSD) of 41.6% was calculated using calibration factors determined from the initial 5 point calibration. The RSD of 41.6% exceeds the recommended QC criteria of 20.0%, primarily due to the 50 ppm calibration standard containing interferences, which produced an artificially high calibration factor. A %RSD of 9.8% was obtained using a range of 200 ppm to 10,000 ppm. Since the initial calibration exceeds the recommended QC criteria of 20.0%, the detected results for diesel in all project samples are qualified "J" as estimated and usable for limited purposes.

C. Continuing Calibration:

C.1 Continuing calibration standard (File 098F1401) reported a percent recovery of 58% exceeding the QC criteria (75-125%). This was due to incorrect integration of the diesel standard areas. The laboratory did not submit a corrected quantitation report. It is the opinion of the reviewer that since all sample results are referenced to the initial calibration, the quality of the data was not affected.

C.2 All other QC criteria for the continuing calibrations were met and the results are considered acceptable.

D. Laboratory Blanks:

D.1 Diesel was not detected in the method blanks associated with the samples at a concentration above the PQLs and the results are considered acceptable.

E. Instrument Blanks:

E.1 Diesel was not detected in the instrument blank at a concentration above the PQL and the results are considered acceptable.

F. Field Blank:

F.1 There was no field blank submitted for analysis with the project sample set.

G. Field Replicate Analyses:

G.1 A QC limit for precision of ≤50 percent as measured by Relative Percent Difference (RPD) between soil sample values, was specified for field replicate comparability.

G.2 Samples BRW-SS02-S04 and BRW-SS02-S05 were utilized for field replicate analyses. The results met all applicable QC criteria, and the results are considered acceptable.

H. Surrogate Recoveries:

H.1 Surrogate recoveries reported by the laboratory for the two samples listed below could not be verified by the reviewer due to interferences present at the retention times of the surrogate. The laboratory did not submit the reintegrated results for proper verification.

ICF Site No.	Laboratory Results	Validator Results
BRW-SS02-S04	107%	interference
BRW-SS02-S05	130%	interference

H.2 All other surrogate recoveries met applicable QC criteria, and the results are considered acceptable.

I. Matrix Spike/Matrix Spike Duplicate:

I.1 Sample number BRW-SS02-S02, which is not part of this sample set but is from the Point Barrow site, was used for the matrix spike/matrix spike duplicate analyses.

I.2 All of the matrix spike/matrix spike duplicate QC criteria were met and the results are considered acceptable.

J. System Performance:

J.1 The lowest point of the initial calibration (10 ppm) could not be achieved due to low sensitivity and interferences at the retention time window of diesel.

J.2 No other problems with system performance were observed for the project sample analyses.

K. Quant itationand Identification:

K.1 The laboratory reported an incorrect PQL (200 ppb) for diesel in the water sample. The 50 ppm calibration standard was the lowest point of the curve that was usable, therefore, the PQL should have been reported as 2500 ppb, and the PQL has been adjusted by the validator on the data summary forms submitted by the laboratory.

K.2 The laboratory reported detected results for diesel at a concentration of 570 ppm in sample BRW-SS02-S04 and 450 ppm in sample BRW-SS02-S05 and indicated it to be lube oil contamination. It is the opinion of the reviewer that the detected peaks in the two samples are probably due to a combination of lube oil and high molecular weight hydrocarbons. Therefore, the PQLs for diesel in the two samples are qualified "J" as estimated and usable for limited purposes.

K.3 No other problems were observed for compound quantitation and identification.

L. Conclusion:

L.1 Diesel was detected in sample BRW-SS01-S01 at 510 ppm. No diesel was detected in the method blanks or other samples.

L.2 Due to the previously mentioned problems with the initial calibration, all detected results are qualified "J" as estimated and usable for limited purposes.

L.3 The PQL for water sample BRW-SS01-SD07 was raised to 2500 ppb.

L.4 The laboratory did not submit any results for sample BRW-SS01-S08.

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DATA VALIDATION REPORT

PROGRAM: POINT BARROW / DEW Line RI/FS (ICF Project No. 41096-412-02)
LABORATORY: Friedman & Bruya, Inc. (Seattle, WA)
REVIEWER: Timothy Vonnahme
ANALYSIS: Diesel by EPA Method 8015M
MATRIX: Soil
DATE: March 21, 1994

I. INTRODUCTION:

Friedman & Bruya, Inc. (Seattle, WA) received 13 soil samples from the Point Barrow site on August 30, 1993 (referenced chain of custody record No. 551) for diesel analysis by the semivolatile organics extraction method described in Section 8 of the Project Sampling and Analysis Plan. The samples were analyzed for diesel by USEPA Method 8015M (modified) (GC/FID) on August 28 and August 29, 1993.

The ICF site identification numbers and corresponding FBI laboratory sample identification numbers are listed below.

ICF Site No.	Lab Sample No.	Matrix
BRW-BKGD-SD01	818	Soil
BRW-BKGD-S01	820	Soil
BRW-BKGD-S02	822	Soil
BRW-BKGD-S03	824	Soil
BRW-BKGD-S04	826	Soil
BRW-AOC2-SD01	828	Soil
BRW-AOC2-SD02	830	Soil
BRW-AOC2-SD03	832	Soil
BRW-AOC2-SD04	834	Soil
BRW-AOC2-SD05	836	Soil
BRW-AOC2-SD06	838	Soil
BRW-AOC2-SD07	840	Soil
BRW-AOC2-SD08	842	Soil

The following QC sample designations were included in project documentation: sample numbers BRW-AOC2-SD07 and BRW-AOC2-SD08 were designated as field replicates.

The analytical results were reported with an adjustment for moisture content.

It should be noted that all quantitation limits reported for project soil samples were higher than those specified in the Project Sampling and Analysis Plan. It is the opinion of the reviewer that the quality of the data was not affected.

The analytical results with qualifications are presented on modified sample data sheets submitted by the laboratory. Definitions of the data qualifiers are listed in Table 1B. This report was prepared in accordance with the USEPA draft document " National Functional Guidelines for Organic Data Review", December 1990, and the analytical guidelines in USEPA Method 8015M, and the Project Sampling and Analysis Plan.

II VALIDITY & COMMENTS:

A. Technical Holding Times:

A.1 Technical Holding time QC criteria were met for all project sample analyses.

B. Initial Calibration:

B.1 The laboratory attempted to perform a 6 point initial calibration curve on GC System #6 on August 21, 1993. The range of the initial calibration was from 50 ppm to 10,000 ppm. The 500 ppm and the 200 ppm standards were not used due to autosampler injection errors. A percent relative standard deviation (%RSD) of 48.3% was calculated using calibration factors determined from the initial calibration. The %RSD of 48.3% exceeds the recommended QC criteria of 20.0%. Since the initial calibration was only a 4 point calibration curve, and the %RSD exceeds the recommended criteria, the detected results for diesel in all the soil samples are qualified "J" as estimated and usable for limited purposes.

C. Continuing Calibration:

C.1 The percent recovery of diesel in the 500 ppm continuing calibration standards associated with the samples are listed below:

File Name	Time/Date	%R	Criteria
098F0301	1638/8-28	163	75-125
098F0901	0539/8-29	159	75-125
098F2401	1657/8-29	162	75-125

Since the percent recoveries of the continuing calibration standards are outside the QC criteria, the detected results and the practical quantitation limits (PQLs) are qualified "J" as estimated and usable for limited purposes.

D. Laboratory Blanks:

D.1 Diesel was not detected in the method blank associated with the samples at a concentration above the practical quantitation limits (PQL), and the results are

considered acceptable.

E. Instrument Blanks:

E.1 Diesel was not detected in the instrument blanks at a concentration above the PQL, and the results are considered acceptable.

F. Field Replicate Analyses:

F.1 A QC limit for precision of ≤50 percent as measured by Relative Percent Difference (RPD) between soil sample values, was specified for field replicate comparability.

F.2 Samples BRW-AOC2-SD07 and BRW-AOC2-SD08 were utilized for field replicate analyses, and reported a RPD of 92.7%, exceeding the QC criteria. In the opinion of the reviewer, it is not known what affect this will have on the quality of the data.

G. Surrogate Recoveries:

G.1 Surrogate spike percent recoveries (%Rs) for project analyses were met for all project samples using the surrogate areas from the closest continuing calibration standard. However, the exact percent recovery reported by the laboratory could not be verified because the laboratory used an average of the surrogate areas from an unknown number of continuing calibration standards to calculate the surrogate recoveries. Calculating the percent recoveries from the closest continuing calibration standard yielded surrogate recoveries very close to the laboratory's results.

G.2 All surrogate recoveries met applicable QC criteria and the results are considered acceptable.

H. Matrix Spike/Matrix Spike Duplicate:

H.1 The sample used for the matrix spike/matrix spike duplicate analyses (LON-SSO1-S10-4) was not sampled from the Point Barrow site. It was selected from the Point Lonely site. It is the opinion of the reviewer that the affect on the data quality is not known.

H.2 The laboratory reported a value of 87% for the MS and 96% for the MSD. All QC criteria for project MS and MSD analyses were met.

I. System Performance:

I.1 The laboratory reported an autosampler malfunction during the injection of two initial calibration standards.

I.2 No problems with system performance were observed for all other project sample analyses.

J. Quantitation and Identification:

J.1 The laboratory reported the incorrect PQLs for samples BRW-BKGD-S03 and BRW-BKGD-S04. The corrected values are listed below.

ICF Site No.	Laboratory Result	Validation Result
BRW-BKGD-S03	< 40 ppm	< 90 ppm
BRW-BKGD-S04	< 130 ppm	< 65 ppm

J.2 Sample BRW-AOC2-SD06 was reported by the laboratory as 60 ppm. The correct value should have been <60 ppm.

J.3 All sample results were quantitated against the closest continuing calibration standard.

J.4 Samples BRW-BKGD-SD01, BRW-BKGD-S01, BRW-BKGD-S03, and BRW-BKGD-S04, exhibited raised baselines in the retention time window of diesel, which in the opinion of the laboratory and reviewer are of biogenic hydrocarbons. Diesel was not detected in any of these samples.

K. Conclusion:

K.1 Due to the previously mentioned problems with the initial calibration and continuing calibrations, all detected results and the PQLs for all project samples are qualified "J" as estimated and useable for limited purposes.

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DATA VALIDATION REPORT

PROGRAM: POINT BARROW / DEW Line RI/FS (ICF Project No. 41096-412-02)
LABORATORY: Friedman & Bruya, Inc. (Seattle, WA)
REVIEWER: Timothy Vonnahme
ANALYSIS: Diesel by EPA Method 8015M
MATRIX: Soil
DATE: April 6, 1994

I. INTRODUCTION:

Friedman & Bruya, Inc. (Seattle, WA) received 16 soil samples from the Point Barrow site on August 27, 1993 (referenced chain of custody record No. 557) on August 27, 1993 for diesel analysis by the semivolatile organics extraction method described in Section 8 of the Project Sampling and Analysis Plan. The samples were analyzed for diesel by USEPA Method 8015M (modified) (GC/FID) on August 31 and September 1, 1993.

The ICF site identification numbers and corresponding FBI laboratory sample identification numbers are listed below.

ICF Site No.	Lab Sample No.	Matrix
BRW-AOC2-S01	1122	Soil
BRW-AOC2-S02	1124	Soil
BRW-AOC2-S03	1126	Soil
BRW-AOC2-S04	1128	Soil
BRW-AOC2-S05	1130	Soil
BRW-AOC2-S06	1132	Soil
BRW-AOC2-S07	1134	Soil
BRW-SS01-SD01	1136	Soil
BRW-SS01-SD02	1138	Soil
BRW-SS01-SD03	1140	Soil
BRW-SS01-SD04	1142	Soil
BRW-SS01-SD05	1144	Soil
BRW-SS02-SD01	1146	Soil
BRW-SS02-S01	1148	Soil
BRW-SS02-S02	1150	Soil
BRW-SS02-S03	1152	Soil

The following QC sample designations were included in project documentation: sample numbers BRW-AOC2-S06 and BRW-AOC2-S07 were designated as field replicates.

The analytical results were reported with an adjustment for moisture content.

The instrument Number-Sequence Date on the Summary Form for Sample BRW-SS01-SD01 (1136), BRW-SS02-SD01 (1146) and sample BRW-SS02-S01 were inadvertently recorded by the laboratory as ICF6 09-03-93 instead of ICF5 08-31-93.

The analytical results with qualifications are presented on modified sample data sheets submitted by the laboratory. Definitions of the data qualifiers are listed in Table 1B. This report was prepared in accordance with the USEPA draft document " National Functional Guidelines for Organic Data Review", December 1990, and the analytical guidelines in USEPA Method 8015M, and the Project Sampling and Analysis Plan.

II. VALIDITY & COMMENTS:

A. Technical Holding Times:

A.1 The technical holding time QC criteria were met for all project sample analyses.

B. Initial Calibration:

B.1 The laboratory analyzed a 6 point initial calibration on GC instrument ICF5 on 8/28/93. The attempted range of the initial calibration was from 10 ppm to 10,000 ppm. Due to low sensitivity and interferences, the 10 ppm calibration standard was deleted from the calibration. All samples were quantitated using a linear regression curve calculated from the initial calibration. A percent relative standard deviation (%RSD) of 41.6% was calculated using calibration factors determined from the initial 5 point calibration. The RSD of 41.6% exceeds the recommended QC criteria of 20.0%, primarily due to the interference in the 50 ppm calibration standard which produced an artificially high calibration factor. A %RSD of 9.8 was obtained using a range of 200 ppm to 10,000 ppm. Since the initial calibration exceeds the recommended QC criteria of 20.0%, the detected results for diesel in all project samples are qualified "J" as estimated and usable for limited purposes.

C. Continuing Calibration:

C.1 All QC criteria for the continuing calibrations were met and the results are considered acceptable.

D. Laboratory Blanks:

D.1 Diesel was not detected in the method blank at a concentration above the practical quantitation limit (PQL) and the results are considered acceptable.

E. Instrument Blanks:

E.1 Diesel was not detected in the instruments blank at a concentration above

the PQL and the results are considered acceptable.

F. Field Blanks:

F.1 There was no field blank submitted for analysis with the project sample set.

G. Field Replicate Analyses:

G.1 A QC limit for precision of ≤50 percent as measured by Relative Percent Difference (RPD) between soil sample values, was specified for field replicate comparability.

G.2 Samples BRW-AOC2-S06 and BRW-AOC2-S07 were utilized for field replicate analyses. The results met all applicable QC criteria, and the results are considered acceptable.

H. Surrogate Recoveries:

H.1 Sample BRW-SS02-SD01 displayed a surrogate recovery of 43%, which is outside the QC criteria of 50-150%. The PQL for this sample is qualified "J" as estimated and usable for limited purposes.

H.2 The laboratory reintegrated the surrogate area due to lube oil contamination and reported a percent recovery of 85% for sample BRW-SS02-S03. Since the laboratory did not submit the corrected quantitation for verification, the PQL is qualified "J" as estimated and usable for limited purposes

H.3. All other surrogate recoveries met applicable QC criteria and the results are considered acceptable.

I. Matrix Spike/Matrix Spike Duplicate:

I.1 Sample number BRW-SS02-S02 was used for the matrix spike/matrix spike duplicate analyses and the results are considered acceptable.

I. System Performance:

J.1 Sample carryover due to high levels of diesel was evident in sample BRW-SS02-S03. It is the opinion of the reviewer that a longer bakeout should have been used to aid in removing higher molecular weight compounds between GC analyses.

J.2 No other problems with system performance were observed for all other project sample analyses.

K. Quantitation and Identification:

K.1 The laboratory reported detected results for diesel at a concentration of 250 ppm in sample BRW-SS02-S02 and indicated it to be lube oil contamination. It is the opinion of the reviewer that the detected peaks in the sample are probably due to a combination of lube oil and high molecular weight hydrocarbons. Therefore, the PQL for diesel in the sample is qualified "J" as estimated and usable for limited purposes.

K.2 The laboratory reported detected results for diesel at a concentration of 830 ppm in sample BRW-SS02-S03 and indicated it to be cutting oil contamination. It is the opinion of the reviewer that the detected peaks in the sample are actually diesel carryover from the previous high level sample. Therefore, the detected results are qualified "R" as rejected and unusable.

K.3 No other problems were observed for compound quantitation and identification.

L. Conclusion:

L.1 Diesel was detected in sample BRW-SS01-SD02 (70 ppm) and sample BRW-SS02-S01 (3300 ppm).

L.2 The reported results for sample BRW-SS02-S03 are rejected due to carryover from the previous high level sample.

L.3 Due to the previously mentioned problems with the initial calibration, all detected results for all project samples are qualified "J" as estimated and usable for limited purposes.

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DATA VALIDATION REPORT

PROGRAM: POINT BARROW / DEW Line RI/FS (ICF Project No. 41096-412-02)
LABORATORY: Friedman & Bruya, Inc. (Seattle, WA)
REVIEWER: Timothy Vonnahme
ANALYSIS: Diesel by EPA Method 8015M
MATRIX: Water
DATE: April 4, 1994

I. INTRODUCTION:

Friedman & Bruya, Inc. (Seattle, WA) received 8 samples from the Point Barrow site on August 26, 1993 (referenced chain of custody record No. 554). Requested analyses were for diesel by the semivolatile organics extraction method described in Section 8 of the Project Sampling and Analysis Plan. The samples were analyzed for diesel by USEPA Method 8015M (modified) (GC/FID) on August 29, 1993.

The ICF site identification numbers and corresponding FBI laboratory sample identification numbers are listed below.

ICF Site No.	Lab Sample No.	Matrix
BRW-AOC2-SW01	843	Water
BRW-AOC2-SW02	844	Water
BRW-AOC2-SW03	845	Water
BRW-AOC2-SW04	846	Water
BRW-AOC2-SW05	847	Water
BRW-AOC2-SW06	848	Water
BRW-AOC2-SW07	849	Water
BRW-AOC2-SW08	850	Water

The following QC sample designations were included in project documentation: sample numbers BRW-AOC2-SW04 and BRW-AOC2-S08 were designated as field duplicates.

It should be noted that all quantitation limits reported by the laboratory (200 ppb) for the water sample were lower than those specified in the Project Sampling and Analysis Plan (500 ppb). The correct practical quantitation limit (PQL) when employing the lowest usable calibration point (50 ppm) should be 2500 ppb.

The analytical results with qualifications are presented on modified sample data sheets submitted by the laboratory. Definitions of the data qualifiers are listed in Table 1B. This report was prepared in accordance with the USEPA draft document " National Functional Guidelines for Organic Data Review", December 1990, and the analytical guidelines in USEPA Method 8015M, and the Project Sampling and Analysis Plan.

II. VALIDITY & COMMENTS:

A. Technical Holding Times:

A.1 Technical Holding time QC criteria were met for all project sample analyses.

B. Initial Calibration:

B.1 The laboratory analyzed a 6 point initial calibration on GC instrument ICF5 on 8/28/93. The attempted range of the initial calibration was from 10 ppm to 10,000 ppm. Due to low sensitivity and interferences, the 10 ppm calibration standard was deleted from the calibration. A percent relative standard deviation (%RSD) of 41.6% was calculated using calibration factors determined from the initial 5 point calibration. The RSD of 41.6% exceeds the recommended QC criteria of 20.0%, primarily due to the interferences in the 50 ppm calibration standard which produced an artificially high calibration factor. A %RSD of 9.8 was obtained using a range of 200 ppm to 10,000 ppm. Since the initial calibration exceeds the recommended QC criteria of 20.0%, the detected results for diesel in all project samples are qualified "J" as estimated and usable for limited purposes.

C. Continuing Calibration:

C.1 QC criteria for the continuing calibrations were met and the results are considered acceptable.

D. Laboratory Blanks:

D.1 Diesel was not detected in the method blank associated with the samples at a concentration above the practical quantitation limit (PQL) and the results are considered acceptable.

E. Instrument Blanks:

E.1 Diesel was not detected in the instrument blank at a concentration above the PQL and the results are considered acceptable.

F. Field Blank:

F.1 There was no field blank submitted for analysis with the project sample set.

G. Field Duplicate Analyses:

G.1 A QC limit for precision of ≤50 percent as measured by Relative Percent

Difference (RPD) between water sample values, was specified for field duplicate comparability.

G.2 Samples BRW-AOC2-SW04 and BRW-AOC2-SW05 were utilized for field duplicate analyses. The results met all applicable QC criteria, and the results are considered acceptable.

H. Surrogate Recoveries:

H.1 Surrogate recoveries met applicable QC criteria and the results are considered acceptable.

I. Matrix Spike/Matrix Spike Duplicate:

I.1 The laboratory did not perform any matrix spike/matrix spike duplicate analyses for the diesel fraction.

J. System Performance:

J.1 The lowest point of the initial calibration (10 ppm) could not be achieved due to low sensitivity and interference at the retention time window of diesel.

J.2 No other problems with system performance were observed for the project sample analyses.

K. Quantitation and Identification:

K.1 The laboratory reported an incorrect PQL (200 ppb) for diesel in the project samples. The 50 ppm calibration standard was the lowest point of the curve that was usable, therefore, the PQL should have been reported as 2500 ppb. The PQL has been adjusted by the validator on the data summary forms submitted by the laboratory.

K.2 No other problems were observed for compound quantitation and identification.

L. Conclusion:

L.1 Diesel was not detected in the method blank or project samples.

L.2 Due to the previously mentioned problems above, the PQL for all samples was raised to 2500 ppb.

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DATA VALIDATION REPORT

PROGRAM:	Point Barrow/DEW Line RI/FS (ICF Project No. 41096-412-02)
LABORATORY:	Friedman & Bruya, Inc. (Seattle, WA)
REVIEWER:	Keith Strout
ANALYSIS:	Gasoline by USEPA Method 8015M
MATRIX:	Soil
DATE:	April 1, 1994

I. INTRODUCTION:

Friedman & Bruya, Inc. (FBI) (Seattle, WA) received 11 samples from the Point Barrow site on August 27, 1993 (referenced chain of custody record No. 558). Nine of the soil samples required gasoline analysis by the volatile organics extraction method described in Section 8 of the Project Sampling and Analysis Plan. The samples were analyzed for gasoline by USEPA Method 8015M (modified) (GC/FID) on September 3, 1993.

The ICF site identification numbers and corresponding FBI laboratory sample identification numbers are listed below.

ICF Site No.	Lab Sample No.	Matrix
BRW-SS01-SD06	1190	Soil
BRW-SS01-SD07	1192	Soil
BRW-SS01-SD08	1194	Soil
BRW-SS01-SD09	1196	Soil
BRW-SS01-S01	1198	Soil
BRW-SS01-S02	1200	Soil
BRW-SS01-S03	1202	Soil
BRW-SS02-S04	1204	Soil
BRW-SS02-S05	1206	Soil

The following QC sample designations were included in project documentation: sample numbers BRW-SS02-S04 and BRW-SS02-S05 were designated as field replicates.

The analytical results were reported with an adjustment for moisture content.

The analytical results with qualifications are presented on modified sample data sheets submitted by the laboratory. Definitions of the data qualifiers are listed in Table 1B. This report was prepared using the guidelines in the USEPA draft document "National Functional Guidelines for Organic Data Review" (December 1990), USEPA Method 8015M, and the Project Sampling and Analysis Plan.

It should be noted that all quantitation limits reported by the laboratory for project soil samples were higher than those specified in the Project Sampling and Analysis Plan. According to the laboratory, all soil samples were extracted in methanol before analysis, as required by the State of Alaska guidelines. It is the opinion of the reviewer that the quality of the data was not affected.

II. VALIDITY & COMMENTS:

A. Technical Holding Times:

A.1 The technical holding time QC criteria were met for all project sample analyses.

B. Initial Calibration:

B.1 The laboratory analyzed a four point initial calibration on system 1-2 on August 19, 1993. The range of the initial calibration was from 50 ppb to 5000 ppb. All samples were quantitated using a linear regression curve calculated from the initial calibration. A percent relative standard deviation (%RSD) of 31.8 was calculated using calibration factors determined from the initial calibration. The 31.8% RSD exceeds the recommended 20.0% RSD, therefore, the detected results for gasoline in all of the samples are qualified "J" as estimated and are usable for limited purposes.

C. Continuing Calibrations:

C.1 The laboratory did not perform any continuing calibrations for the gasoline fraction. The laboratory indicated that since the same injection was used to analyze for gasoline and the BTEX compounds, the continuing calibration response on the FID for the BTEX compounds and the surrogate were used to determine linearity for the gasoline fraction. It is the opinion of the reviewer that the laboratory should have run continuing calibrations for the gasoline fraction, however, the response for the BTEX compounds and the surrogate compound can be used to determine if the instrument has maintained linearity for the gasoline fraction. Because the laboratory did not perform any continuing calibrations specifically for the gasoline fraction, the detected results and the practical quantitation limits (PQLs) are qualified "J" as estimated and are usable for limited purposes.

C.2 All QC criteria for the BTEX continuing calibrations were met and the results are considered acceptable.

D. Laboratory Blanks:

D.1 Gasoline was not detected in the method blanks at a concentration above the

PQL and the results are considered acceptable.

E. Instrument Blanks:

E.1 Gasoline was not detected in the instrument blanks at a concentration above the PQL and the results are considered acceptable.

F. Field Blanks:

F.1 There were no field blanks submitted for analysis with the project sample set.

G. Field Replicate Analysis:

G.1 A QC limit for precision of ≤ 50%, as measured by Relative Percent Difference (RPD) between soil sample values, was specified for field replicate comparability.

G.2 Samples BRW-SS02-S04 and BRW-SS02-S05 were utilized for field replicate analysis. The results of the field replicate analyses met all applicable QC criteria and the results are considered acceptable.

H. Surrogate Recoveries:

H.1 The laboratory reported the surrogate recoveries as determined from the response on the PID which is the detector used to quantitate several of the volatile organic compounds present in the samples. All of the surrogate recoveries quantitated using the response from the FID detector were determined by the reviewer and are reported below.

ICF Sample No.	PID % Recovery	FID % Recovery
BRW-SS01-SD06	98	106
BRW-SS01-SD07	94	106
BRW-SS01-SD08	95	106
BRW-SS01-SD09	93	96
BRW-SS01-S01	104	104
BRW-SS01-S02	101	112
BRW-SS01-S03	103	112
BRW-SS02-S04	95	109
BRW-SS02-S05	95	115

H.2 All of the surrogate QC recovery criteria were met and the results are considered acceptable.

I. Matrix Spike/Matrix Spike Duplicate Analyses:

I.1 The laboratory did not perform any matrix spike/matrix spike duplicate analyses for the gasoline fraction.

J. System Performance:

J.1 Several of the chromatograms displayed possible carryover of high molecular weigh hydrocarbons from previous analyses. It is the opinion of the reviewer that the laboratory should have allowed for a longer bake-out time between analyses and

performed instrument blank analyses more often between samples.

J.2 No other problems with system performance were observed for the project samples.

K. <u>Quantitation and Identification:</u>

K.1 The laboratory reported a detected result for gasoline at a concentration of 30 ppm in sample BRW-SS01-SD06 and indicated that it may be due to possible carryover of high molecular weight hydrocarbons in the previous sample. It is the opinion of the reviewer that the detected peaks in this sample are possibly due to carryover from the previous sample. Therefore, the detected result for gasoline in sample number BRW-SS01-SD06 is qualified "R" as rejected and is unusable.

K.2 The laboratory reported a detected result for gasoline at a concentration of 210 ppm in sample BRW-SS01-S01 and indicated that it may be due to diesel fuel. It is the opinion of the reviewer that the detected peaks in this sample are probably due to a combination of gasoline and higher molecular weight hydrocarbons. Therefore, the detected result for gasoline in sample number BRW-SS01-S01 is qualified "J" as estimated and usable for limited purposes.

K.3 No other problems were observed with compound quantitation and identification.

L. <u>Conclusion:</u>

L.1 Due to possible carryover of high molecular weight hydrocarbons in the previous sample, the detected result for gasoline in sample BRW-SS01-SD06 is qualified "R" as rejected and is unusable.

L.2 Due to the previously mentioned problems with the initial calibration and the continuing calibration, the detected results and PQLs for all other project samples are qualified "J" as estimated and usable for limited purposes.

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DATA VALIDATION REPORT

PROGRAM: Point Barrow/DEW Line RI/FS (ICF Project No. 41096-412-02)
LABORATORY: Friedman & Bruya, Inc. (Seattle, WA)
REVIEWER: Keith Strout
ANALYSIS: Gasoline by USEPA Method 8015M
MATRIX: Soil
DATE: April 4, 1994

I. INTRODUCTION:

Friedman & Bruya, Inc. (FBI) (Seattle, WA) received 16 soil samples from the Point Barrow site on August 27, 1993 (referenced chain of custody record No. 557). All of the soil samples required gasoline analysis by the volatile organics extraction method described in Section 8 of the Project Sampling and Analysis Plan. The samples were analyzed for gasoline by USEPA Method 8015M (modified) (GC/FID) on September 3 and September 4, 1993.

The ICF site identification numbers and corresponding FBI laboratory sample identification numbers are listed below.

ICF Site No.	Lab Sample No.	Matrix
BRW-AOC2-S01	1122	Soil
BRW-AOC2-S02	1124	Soil
BRW-AOC2-S03	1126	Soil
BRW-AOC2-S04	1128	Soil
BRW-AOC2-S05	1130	Soil
BRW-AOC2-S06	1132	Soil
BRW-AOC2-S07	1134	Soil
BRW-SS01-SD01	1136	Soil
BRW-SS01-SD02	1138	Soil
BRW-SS01-SD03	1140	Soil
BRW-SS01-SD04	1142	Soil

BRW-SS01-SD05	1144	Soil
BRW-SS02-SD01	1146	Soil
BRW-SS02-S01	1148	Soil
BRW-SS02-S02	1150	Soil
BRW-SS02-S03	1152	Soil

The following QC sample designations were included in project documentation: sample numbers BRW-AOC2-S06 and BRW-AOC2-S07 were designated as field replicates.

The analytical results were reported with an adjustment for moisture content.

The analytical results with qualifications are presented on modified sample data sheets submitted by the laboratory. Definitions of the data qualifiers are listed in Table 1B. This report was prepared using the guidelines in the USEPA draft document "National Functional Guidelines for Organic Data Review" (December 1990), USEPA Method 8015M, and the Project Sampling and Analysis Plan.

It should be noted that all quantitation limits reported by the laboratory for project soil samples were higher than those specified in the Project Sampling and Analysis Plan. According to the laboratory, all soil samples were extracted in methanol before analysis, as required by the State of Alaska guidelines. It is the opinion of the reviewer that the quality of the data was not affected.

II. VALIDITY & COMMENTS:

A. Technical Holding Times:

A.1 The technical holding time QC criteria were met for all project sample analyses.

B. Initial Calibration:

B.1 The laboratory analyzed a four point initial calibration on system 1-2 on August 19, 1993. The range of the initial calibration was from 50 ppb to 5000 ppb. All samples were quantitated using a linear regression curve calculated from the initial calibration. A percent relative standard deviation (%RSD) of 31.8 was calculated using calibration factors determined from the initial calibration. The 31.8% RSD exceeds the recommended 20.0% RSD, therefore, the detected results for gasoline in all of the samples are qualified "J" as estimated and are usable for limited purposes.

C. Continuing Calibrations:

C.1 The laboratory did not perform any continuing calibrations for the gasoline fraction. The laboratory indicated that since the same injection was used to analyze for gasoline and the BTEX compounds, the continuing calibration response on the FID for the BTEX compounds and the surrogate were used to determine linearity for the gasoline fraction. It is the opinion of the reviewer that the laboratory should have run continuing calibrations for the gasoline fraction, however, the response for the BTEX compounds and the surrogate compound can be used to determine if the instrument has maintained linearity for the gasoline fraction. Because the laboratory

did not perform any continuing calibrations specifically for the gasoline fraction, the detected results and the practical quantitation limits (PQLs) are qualified "J" as estimated and are usable for limited purposes.

C.2 All QC criteria for the BTEX continuing calibrations were met and the results are considered acceptable.

D. Laboratory Blanks:

D.1 Gasoline was not detected in the method blanks at a concentration above the PQL and the results are considered acceptable.

E. Instrument Blanks:

E.1 Gasoline was not detected in the instrument blanks at a concentration above the PQL and the results are considered acceptable.

F. Field Blanks:

F.1 There were no field blanks submitted for analysis with the project sample set.

G. Field Replicate Analysis:

G.1 A QC limit for precision of ≤ 50%, as measured by Relative Percent Difference (RPD) between soil sample values, was specified for field replicate comparability.

G.2 Samples BRW-AOC2-S06 and BRW-AOC2-S07 were utilized for field replicate analysis. The results of the field replicate analyses met all applicable QC criteria and the results are considered acceptable.

H. Surrogate Recoveries:

H.1 The laboratory reported some of the surrogate recoveries as determined from the response on the PID which is the detector used to quantitate several of the volatile organic compounds present in the samples. All of the surrogate recoveries quantitated using the response from the FID detector were determined by the reviewer and are reported below.

ICF Sample No.	PID % Recovery	FID % Recovery
BRW-SS01-SD01	93	146
BRW-SS01-SD02	78	130
BRW-SS01-SD04	97	127
BRW-SS01-SD05	95	119
BRW-SS02-SD01	97	114
BRW-SS02-S01	88	77
BRW-SS02-S02	94	106
BRW-SS02-S03	111	117

H.2 All of the surrogate QC recovery criteria were met and the results are considered acceptable.

I. Matrix Spike/Matrix Spike Duplicate Analyses:

I.1 The laboratory did not perform any matrix spike/matrix spike duplicate analyses for the gasoline fraction.

J. System Performance:

J.1 No problems with system performance were observed for the project samples.

K. Quantitation and Identification:

K.1 The laboratory reported detected results for gasoline in samples BRW-SS01-SD05, BRW-SS02-S03, BRW-SS01-SD02, and BRW-SS02-S01 and indicated that the detected results may be due to diesel fuel. It is the opinion of the reviewer that the detected peaks in these samples are probably due to a combination of gasoline and higher molecular weight hydrocarbons. Therefore, the detected result for gasoline in these samples are qualified "J" as estimated and usable for limited purposes.

K.2 The laboratory did not report any detected results for gasoline above 1 ppm in sample BRW-AOC2-S01. The laboratory reported detected results for the BTEX compounds in this sample and the sample chromatogram exhibits a typical gasoline elution pattern. It is the opinion of the reviewer that this sample contains gasoline calculated at a concentration of 11 ppm.

K.3 The laboratory did not report any detected results for gasoline above 1 ppm in samples BRW-SS01-SD04 and BRW-SS01-SD01. The laboratory reported detected results for the BTEX compounds in these samples and the sample chromatograms exhibit a typical hydrocarbon elution pattern. It is the opinion of the reviewer that these samples contain a combination of gasoline and higher molecular weight hydrocarbons calculated at the concentrations listed below.

ICF Sample No.	Laboratory Result	Validation Result
BRW-SS01-SD04	< 1 ppm	14 ppm
BRW-SS01-SD01	< 1 ppm	12 ppm

The detected results for gasoline in these samples are qualified "J" as estimated and are usable for limited purposes.

K.4 Discrepancies exist between the detected results reported by the laboratory and the results regenerated by the reviewer for some of the project samples. Listed below are the sample results where discrepancies exist. Results are reported in parts per million (ppm).

ICF Site No.	Laboratory Results	Validation Results
BRW-SS01-SD05	23	28
BRW-SS02-S03	27	63
BRW-SS02-S01	69	113

The laboratory indicated that the discrepancies are probably due to inconsistent quantitation procedures. The laboratory was unable to reproduce some of the reported detected results for gasoline which indicates that inconsistent quantitation procedures may have been used.

K.5 No other problems were observed with compound quantitation and identification.

L. Conclusion:

L.1 Due to previously mentioned problems with the initial calibration, continuing calibration, and sample quantitation, all detected results and PQLs for all project samples are qualified "J" as estimated and usable for limited purposes.

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DATA VALIDATION REPORT

PROGRAM:	Point Barrow/DEW Line RI/FS (ICF Project No. 41096-412-02)
LABORATORY:	Friedman & Bruya, Inc. (Seattle, WA)
REVIEWER:	Keith Strout
ANALYSIS:	Gasoline by USEPA Method 8015M
MATRIX:	Water
DATE:	March 29, 1994

I. INTRODUCTION:

Friedman & Bruya, Inc. (FBI) (Seattle, WA) received 10 water samples on August 27, 1993 for gasoline analysis by the volatile organics extraction method described in Section 8 of the Project Sampling and Analysis Plan. The samples were analyzed for gasoline by USEPA Method 8015M (modified) (GC/FID) on September 2 and September 3, 1993.

The ICF site identification numbers and corresponding FBI laboratory sample identification numbers are listed below.

ICF Site No.	Lab Sample No.	Matrix
BRW-TB02	1154	Water
BRW-EB01	1158	Water
BRW-SS01-SW01	1162	Water
BRW-SS01-SW02	1166	Water
BRW-SS01-SW03	1170	Water
BRW-SS01-SW04	1174	Water
BRW-SS01-SW05	1178	Water
BRW-SS01-SW06	1182	Water
BRW-SS01-SW07	1184	Water
BRW-SS01-SW08	1188	Water

The following QC sample designations were included in project documentation: sample numbers BRW-SS01-SW02 and BRW-SS01-SW08 were designated as field duplicates,

sample number BRW-TB02 was designated as a travel blank, and sample number BRW-EB01 was designated as an equipment blank.

The analytical results with qualifications are presented on modified sample data sheets submitted by the laboratory. Definitions of the data qualifiers are listed in Table 1B. This report was prepared using the guidelines in the USEPA draft document "National Functional Guidelines for Organic Data Review" (December 1990), USEPA Method 8015M, and the Project Sampling and Analysis Plan.

II. VALIDITY & COMMENTS:

A. Technical Holding Times:

A.1 The technical holding time QC criteria were met for all project sample analyses.

B. Initial Calibration:

B.1 The laboratory analyzed a four point initial calibration on system 3-4 on August 24, 1993. The range of the initial calibration was from 100 ppb to 5000 ppb. All samples were quantitated using a linear regression curve calculated from the initial calibration. A percent relative standard deviation (%RSD) of 27.4 was calculated using calibration factors determined from the initial calibration. The 27.4% RSD exceeds the recommended 20.0% RSD, therefore, the detected results for gasoline in all of the samples are qualified "J" as estimated and are usable for limited purposes.

C. Continuing Calibrations:

C.1 The laboratory did not perform any continuing calibrations for the gasoline fraction. The laboratory indicated that since the same injection was used to analyze for gasoline and the BTEX compounds, the continuing calibration response on the FID for the BTEX compounds and the surrogate were used to determine linearity for the gasoline fraction. It is the opinion of the reviewer that the laboratory should have run continuing calibrations for the gasoline fraction, however, the response for the BTEX compounds and the surrogate compound can be used to determine if the instrument has maintained linearity for the gasoline fraction. Because the laboratory did not perform any continuing calibrations specifically for the gasoline fraction, the detected results and the practical quantitation limits (PQLs) are qualified "J" as estimated and are usable for limited purposes.

C.2 All QC criteria for the BTEX continuing calibrations were met and the results are considered acceptable.

D. Laboratory Blanks:

D.1 Gasoline was not detected in the method blanks at a concentration above the PQL and the results are considered acceptable.

E. Instrument Blanks:

E.1 Gasoline was not detected in the instrument blanks at a concentration above the PQL and the results are considered acceptable.

F. Field Blanks:

F.1 Gasoline was not detected in the equipment blank or the travel blank at a concentration above the PQL and the results are considered acceptable.

G. Field Duplicate Analysis:

G.1 A QC limit for precision of ≤ 20%, as measured by Relative Percent Difference (RPD) between water sample values, was specified for field duplicate comparability.

G.2 Samples BRW-SS01-SW02 and BRW-SS01-SW08 were utilized for field duplicate analysis. The results of the field duplicate analyses met all applicable QC criteria and the results are considered acceptable.

H. Surrogate Recoveries:

H.1 A discrepancy exists between the surrogate recovery reported by the laboratory (110%) and the surrogate recovery calculated by the reviewer (100%) in sample number BRW-SS01-SW03. The discrepancy is not expected to have an affect on the quality of the data because the surrogate QC criteria were met.

H.2 All surrogate recoveries met applicable QC criteria and the results are considered acceptable.

I. Matrix Spike/Matrix Spike Duplicate Analyses:

I.1 The laboratory did not perform any matrix spike/matrix spike duplicate analyses for the gasoline fraction.

J. System Performance:

J.1 No problems with system performance were observed for all project sample analyses.

K. Quantitation and Identification:

K.1 A discrepancy exists between the detected result reported by the laboratory and the result regenerated by the reviewer for sample BRW-SS01-SW01. Listed below is the result reported by the laboratory and the result calculated by the reviewer. Results are reported in parts per billion (ppb).

ICF Site No.	Laboratory Result	Validation Result
BRW-SS01-SW01	470	1690

The laboratory indicated that the discrepancies are probably due to inconsistent quantitation procedures. The laboratory was unable to reproduce some of the reported detected results for gasoline which indicates that inconsistent quantitation procedures may have been used.

K.2 The laboratory reported PQLs of 50 ppb for gasoline in all of the project samples . The lowest calibration point in the initial calibration is 100 ppb, therefore the PQLs should have been reported as 100 ppb. The PQLs have been adjusted on

the data summary forms submitted by the laboratory.

L. Conclusion:

L.1 Due to the previously mentioned problems with the initial calibration and the continuing calibration, all detected results and PQLs for all project samples are qualified "J" as estimated and usable for limited purposes.

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DATA VALIDATION REPORT

PROGRAM:	Point Barrow/DEW Line RI/FS (ICF Project No. 41096-412-02)
LABORATORY:	Friedman & Bruya, Inc. (Seattle, WA)
REVIEWER:	Keith Strout
ANALYSIS:	Gasoline by USEPA Method 8015M
MATRIX:	Soil
DATE:	March 22, 1994

I. INTRODUCTION:

Friedman & Bruya, Inc. (FBI) (Seattle, WA) received 13 soil samples on August 27, 1993 for gasoline analysis by the volatile organics extraction method described in Section 8 of the Project Sampling and Analysis Plan. The samples were analyzed for gasoline by USEPA Method 8015M (modified) (GC/FID) on August 29,1993.

The ICF site identification numbers and corresponding FBI laboratory sample identification numbers are listed below.

ICF Site No.	Lab Sample No.	Matrix
BRW-BKGD-SD01	818	Soil
BRW-BKGD-S01	820	Soil
BRW-BKGD-S02	822	Soil
BRW-BKGD-S03	824	Soil
BRW-BKGD-S04	826	Soil
BRW-AOC2-SD01	828	Soil
BRW-AOC2-SD02	830	Soil
BRW-AOC2-SD03	832	Soil
BRW-AOC2-SD04	834	Soil
BRW-AOC2-SD05	836	Soil
BRW-AOC2-SD06	838	Soil
BRW-AOC2-SD07	840	Soil
BRW-AOC2-SD08	842	Soil

The following QC sample designations were included in project documentation: sample numbers BRW-AOC2-SD07 and BRW-AOC2-SD08 were designated as field replicates.

The analytical results were reported with an adjustment for moisture content.

It should be noted that all quantitation limits reported by the laboratory for project soil samples were higher than those specified in the Project Sampling and Analysis Plan. According to the laboratory, all soil samples were extracted in methanol before analysis, as required by the State of Alaska guidelines. It is the opinion of the reviewer that the quality of the data was not affected.

The analytical results with qualifications are presented on modified sample data sheets submitted by the laboratory. Definitions of the data qualifiers are listed in Table 1B. This report was prepared using the guidelines in the USEPA draft document "National Functional Guidelines for Organic Data Review" (December 1990), USEPA Method 8015M, and the Project Sampling and Analysis Plan.

II. VALIDITY & COMMENTS:

A. Technical Holding Times:

A.1 The technical holding time QC criteria were met for all project sample analyses.

B. Initial Calibration:

B.1 The laboratory analyzed a four point initial calibration on system 3-4 on August 24, 1993. The range of the initial calibration was from 100 ppb to 5000 ppb. All samples were quantitated using a linear regression curve calculated from the initial calibration. A percent relative standard deviation (%RSD) of 27.4 was calculated using calibration factors determined from the initial calibration. The 27.4% RSD exceeds the recommended 20.0% RSD, therefore, the detected results for gasoline in all of the soil samples are qualified "J" as estimated and are usable for limited purposes.

C. Continuing Calibrations:

C.1 The percent recovery for gasoline in the 10 ppm continuing calibration performed on August 29, 1993 was 156% which exceeds the recommended QC criteria of 75-125%. Therefore, the detected results and the practical quantitation limit (PQL) are qualified "J" as estimated and are usable for limited purposes.

D. Laboratory Blanks:

D.1 Gasoline was not detected in the method blanks at a concentration above the PQL and the results are considered acceptable.

E. Instrument Blanks:

E.1 Gasoline was not detected in the instrument blanks at a concentration above the PQL and the results are considered acceptable.

F. Field Replicate Analysis:

F.1 A QC limit for precision of ≤ 50%, as measured by Relative Percent Difference (RPD) between soil sample values, was specified for field replicate comparability.

F.2 Samples BRW-AOC2-SD07 and BRW-AOC2-SD08 were utilized for field replicate analysis. The results of the field replicate analyses met all applicable QC criteria and the results are considered acceptable.

G. Surrogate Recoveries:

G.1 The laboratory quantitated and reported several surrogate recoveries using the ECD detector when interference from hydrocarbons resulted in high recoveries from the FID detector. It is the opinion of the reviewer that the laboratory should have reported the surrogate recoveries for the gasoline analyses using the FID detector since all of the gasoline results were quantitated using this detector. Listed below are the surrogate recoveries quantitated by ECD and reported by the laboratory, and the surrogate recoveries quantitated by the reviewer using the FID.

ICF Site No.	ECD % Recovery	FID % Recovery
BRW-AOC2-SD02	117	196
BRW-AOC2-SD05	94	360
BRW-AOC2-SD06	86	220
BRW-AOC2-SD07	106	273
BRW-AOC2-SD08	100	294

It is the opinion of the reviewer that the high surrogate recoveries in the above samples are a result of interference from gasoline in the samples and are not expected to affect the quality of the data.

G.2 All other surrogate recoveries met applicable QC criteria and the results are considered acceptable

H. Matrix Spike/Matrix Spike Duplicate Analyses:

H.1 The laboratory did not perform any matrix spike/matrix spike duplicate analyses for the gasoline fraction.

I. System Performance:

I.1 The laboratory reported that data acquisition during the analysis of sample BRW-AOC2-SD03 (Lab No. 832) was interrupted and data for this sample was lost. The laboratory did not reanalyze this sample.

I.2 No problems with system performance were observed for all other project sample analyses.

J. Quantitation and Identification:

J.1 Gasoline was detected in samples BRW-AOC2-SD02, BRW-AOC2-SD07, and BRW-AOC2-SD08 at a concentration above the initial calibration range of the instrument. The laboratory did not analyze a secondary dilution for these samples.

Therefore, the detected results for these samples are qualified "J" as estimated and usable for limited purposes.

J.2 Discrepancies exist between the detected results reported by the laboratory and the results regenerated by the reviewer for some of the project samples. Listed below are the sample results where discrepancies exist. Results are reported in parts per million (ppm).

ICF Site No.	Laboratory Results	Validation Results
BRW-AOC2-SD05	57	114
BRW-AOC2-SD07	280	790
BRW-AOC2-SD08	340	960

The laboratory's detected results for sample BRW-AOC2-SD05 was due to an incorrect adjustment for moisture content. The laboratory indicated that the other discrepancies are probably due to inconsistent quantitation procedures. The laboratory was unable to reproduce some of the reported detected results for gasoline which indicates that inconsistent quantitation procedures may have been used.

J.3 The reported PQLs for gasoline in samples BRW-BKGD-S03 and BRW-BKGD-S04 were incorrectly adjusted for moisture content. The PQLs for these samples have been corrected on the data forms by the reviewer.

J.4 Samples BRW-AOC2-SD04 and BRW-AOC2-SD06 exhibited chromatographic peaks which, in the opinion of the laboratory and the reviewer, are of biogenic origin. Gasoline was not reported in either of the samples.

K. Conclusion:

K.1 Due to previously mentioned problems with the initial calibration, continuing calibration, and sample quantitation, all detected results and PQLs for all project samples are qualified "J" as estimated and usable for limited purposes.

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DATA VALIDATION REPORT

PROGRAM: Point Barrow/DEW Line RI/FS (ICF Project No. 41096-412-02)
LABORATORY: Friedman & Bruya, Inc. (Seattle, WA)
REVIEWER: Keith Strout
ANALYSIS: Gasoline by USEPA Method 8015M
MATRIX: Water
DATE: March 31, 1994

I. INTRODUCTION:

Friedman & Bruya, Inc. (FBI) (Seattle, WA) received 11 water samples on August 26, 1993 for gasoline analysis by the volatile organics extraction method described in Section 8 of the Project Sampling and Analysis Plan. The samples were analyzed for gasoline by USEPA Method 8015M (modified) (GC/FID) on August 27, 1993.

The ICF site identification numbers and corresponding FBI laboratory sample identification numbers are listed below.

ICF Site No.	Lab Sample No.	Matrix
BRW-TB01	776	Water
BRW-BKGD-SW01	780	Water
BRW-BKGD-SW02	786	Water
BRW-AOC2-SW01	794	Water
BRW-AOC2-SW02	798	Water
BRW-AOC2-SW03	800	Water
BRW-AOC2-SW04	804	Water
BRW-AOC2-SW05	806	Water
BRW-AOC2-SW06	810	Water
BRW-AOC2-SW07	812	Water
BRW-AOC2-SW08	814	Water

The following QC sample designations were included in project documentation: sample

numbers BRW-AOC2-SW04 and BRW-AOC2-SW08 were designated as field duplicates and sample number BRW-TB01 was designated as a travel blank.

The analytical results with qualifications are presented on modified sample data sheets submitted by the laboratory. Definitions of the data qualifiers are listed in Table 1B. This report was prepared using the guidelines in the USEPA draft document "National Functional Guidelines for Organic Data Review" (December 1990), USEPA Method 8015M, and the Project Sampling and Analysis Plan.

II. VALIDITY & COMMENTS:

A. Technical Holding Times:

A.1 The technical holding time QC criteria were met for all project sample analyses.

B. Initial Calibration:

B.1 The laboratory analyzed a four point initial calibration on system 1-2 on August 19, 1993. The range of the initial calibration was from 50 ppb to 5000 ppb. All samples were quantitated using a linear regression curve calculated from the initial calibration. A percent relative standard deviation (%RSD) of 31.8 was calculated using calibration factors determined from the initial calibration. The 31.8% RSD exceeds the recommended 20.0% RSD, therefore, the detected results for gasoline in all of the samples are qualified "J" as estimated and are usable for limited purposes.

C. Continuing Calibrations:

C.1 The laboratory did not perform any continuing calibrations for the gasoline fraction. The laboratory indicated that since the same injection was used to analyze for gasoline and the BTEX compounds, the continuing calibration response on the FID for the BTEX compounds and the surrogate were used to determine linearity for the gasoline fraction. It is the opinion of the reviewer that the laboratory should have run continuing calibrations for the gasoline fraction, however, the response for the BTEX compounds and the surrogate compound can be used to determine if the instrument has maintained linearity for the gasoline fraction. Because the laboratory did not perform any continuing calibrations specifically for the gasoline fraction, the detected results and the practical quantitation limits (PQLs) are qualified "J" as estimated and are usable for limited purposes.

C.2 All QC criteria for the BTEX continuing calibrations were met and the results are considered acceptable.

D. Laboratory Blanks:

D.1 Gasoline was not detected in the method blanks at a concentration above the PQL and the results are considered acceptable.

E. Instrument Blanks:

E.1 Gasoline was not detected in the instrument blanks at a concentration above the PQL and the results are considered acceptable.

F. Field Blanks:

F.1 Gasoline was not detected in the travel blank at a concentration above the PQL and the results are considered acceptable.

G. Field Duplicate Analysis:

G.1 A QC limit for precision of ≤ 20%, as measured by Relative Percent Difference (RPD) between water sample values, was specified for field duplicate comparability.

G.2 Samples BRW-AOC2-SW04 and BRW-AOC2-SW08 were utilized for field duplicate analysis. The results of the field duplicate analyses met all applicable QC criteria and the results are considered acceptable.

H. Surrogate Recoveries:

H.1 All surrogate recoveries met applicable QC criteria and the results are considered acceptable.

I. Matrix Spike/Matrix Spike Duplicate Analyses:

I.1 The laboratory did not perform any matrix spike/matrix spike duplicate analyses for the gasoline fraction.

J. System Performance:

J.1 No problems with system performance were observed for all project sample analyses.

K. Quantitation and Identification:

K.1 Discrepancies exist between the detected results reported by the laboratory and the results regenerated by the reviewer for samples BRW-AOC2-SW03 and BRW-AOC2-SW05. Listed below are the results reported by the laboratory and the results calculated by the reviewer. Results are reported in parts per billion (ppb).

ICF Site No.	Laboratory Result	Validation Result
BRW-AOC2-SW03	200	136
BRW-AOC2-SW05	1600	1126

The laboratory indicated that the discrepancies are probably due to inconsistent quantitation procedures. The laboratory was unable to reproduce some of the reported detected results for gasoline which indicates that inconsistent quantitation procedures may have been used.

K.2 The laboratory did not submit the raw data for sample BRW-AOC2-SW07 (FBI #812). The laboratory was requested to supply all of the raw data for this sample, but they have indicated that they are unable to locate either the hardcopy or electronic data for this sample. Therefore, the detected result for gasoline in sample BRW-AOC2-SW07 is qualified "R" as rejected and is unusable.

L. Conclusion:

L.1 Due to the laboratory's inability to supply the raw data for sample BRW-AOC2-SW05, the detected result for gasoline in this sample is qualified "R" as rejected and is unusable.

L.2 Due to the previously mentioned problems with the initial calibration and the continuing calibrations, the detected results and PQLs for all other project samples are qualified "J" as estimated and usable for limited purposes.

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DATA VALIDATION REPORT

PROGRAM:	Point Barrow/DEW Line RI/FS (ICF Project No. 41096-412-02)
LABORATORY:	Friedman & Bruya, Inc. (Seattle, WA)
REVIEWER:	Keith Strout
ANALYSIS:	HVOCs by USEPA Method 8010 and BTEX compounds by USEPA Method 8020
MATRIX:	Soil
DATE:	April 1, 1994

I. INTRODUCTION:

Friedman & Bruya, Inc. (FBI) (Seattle, WA) received 11 samples from the Point Barrow site on August 27, 1993 (referenced chain of custody record No. 558). Nine of the soil samples required analysis for halogenated volatile organic compounds (HVOCs) and BTEX compounds by the volatile organics extraction method described in Section 8 of the Project Sampling and Analysis Plan. The samples were analyzed on September 3, 1993 for HVOCs by USEPA Method 8010, and BTEX compounds by USEPA Method 8020.

The ICF site identification numbers and corresponding FBI laboratory sample identification numbers are listed below.

ICF Site No.	Lab Sample No.	Matrix
BRW-SS01-SD06	1190	Soil
BRW-SS01-SD07	1192	Soil
BRW-SS01-SD08	1194	Soil
BRW-SS01-SD09	1196	Soil
BRW-SS01-S01	1198	Soil
BRW-SS01-S02	1200	Soil
BRW-SS01-S03	1202	Soil
BRW-SS02-S04	1204	Soil
BRW-SS02-S05	1206	Soil

The following QC sample designations were included in project documentation: sample numbers BRW-SS02-S04 and BRW-SS02-S05 were designated as field replicates.

The analytical results with qualifications are presented on modified sample data sheets submitted by the laboratory. Definitions of the data qualifiers are listed in Table 1B. This report was prepared using the guidelines in the USEPA draft document "National Functional Guidelines for Organic Data Review" (December 1990), USEPA Method 8015M, and the Project Sampling and Analysis Plan.

The analytical results were reported with an adjustment for moisture content.

It should be noted that all quantitation limits reported by the laboratory for HVOCs for project soil samples were higher than those specified in the Project Sampling and Analysis Plan. According to the laboratory, all soil samples were extracted in methanol before analysis, as required by the State of Alaska guidelines. It is the opinion of the reviewer that the quality of the data was not affected.

II. VALIDITY & COMMENTS:

A. Technical Holding Times:

A.1 The technical holding time QC criteria were met for all project sample analyses.

B. Initial Calibration:

B.1 The laboratory analyzed a five point initial calibration on system 1-2 on August 19, 1993. The range of the initial calibration was from 1 ppb to 1000 ppb. All samples were quantitated using a linear regression curve calculated from the initial calibration. Percent relative standard deviations (%RSDs) were calculated for all compounds using the calibration factors from the initial calibration using the FID detector. The % RSDs for the following compounds exceeded the recommended QC criteria of 20.0%.

Compound	% RSD
benzene	28.3 %
o-xylene	26.5 %

Due to the large percent RSDs, the detected results for these compounds in all project samples are qualified "J" as estimated and are usable for limited purposes.

B.2 The laboratory was unable to demonstrate linearity throughout the quantitation range using the ECD detector because the detector was saturated at low concentrations. It is the opinion of the reviewer that the ECD detector can be used only to confirm the presence of the halogenated compounds. Quantitation of the halogenated compounds should be done on the PID or FID detector when possible, and only if compound detection was confirmed on the ECD.

C. Continuing Calibrations:

C.1 The continuing calibrations were performed at a concentration of 500 ppb. At this concentration, the ECD response for all of the halogenated compounds is saturated. Therefore, the ECD detector should only be used to confirm the presence of the halogenated compounds.

C.2 All other QC criteria for the continuing calibrations were met and the results are considered acceptable.

D. Laboratory Blanks:

D.1 No target analytes were detected in the method blanks at a concentration above the practical quantitation limit (PQL) and the results are considered acceptable.

E. Instrument Blanks:

E.1 No target analytes were detected in the instrument blanks at a concentration above the PQL and the results are considered acceptable.

F. Field Blanks:

F.1 There were no field blanks submitted for analysis with this project sample set.

G. Field Replicate Analysis:

G.1 A QC limit for precision of ≤ 50%, as measured by Relative Percent Difference (RPD) between soil sample values, was specified for field replicate comparability.

G.2 Samples BRW-SS02-S04 and BRW-SS02-S05 were utilized for field replicate analysis. The results of the field replicate analyses met all applicable QC criteria and the results are considered acceptable.

H. Surrogate Recoveries:

H.1 All surrogate recoveries met applicable QC criteria and the results are considered acceptable.

I. Matrix Spike/Matrix Spike Duplicate Analyses:

I.1 Sample number BRW-SS02-S02, which is not part of this sample set but is from the Point Barrow site, was used for the matrix spike/matrix spike duplicate analyses.

I.2 All of the matrix spike/matrix spike duplicate QC criteria were met and the results are considered acceptable.

J. System Performance:

J.1 Several of the chromatograms displayed possible carryover of high molecular weigh hydrocarbons from previous analyses. It is the opinion of the reviewer that the laboratory should have allowed for a longer bake-out time between analyses and performed instrument blank analyses more often between samples.

J.2 No other problems with system performance were observed for the project samples.

K. Quantitation and Identification:

K.1 The laboratory reported a detected result for toluene at a concentration of 1 ppm in sample BRW-SS01-S03 and indicated that it may be due to possible

carryover from the previous sample. It is the opinion of the reviewer that the presence of toluene in this sample is probably due to carryover from the previous sample because the laboratory has not demonstrated that sufficient bake-out times and instrument blanks have been performed to prevent cross-contamination. Therefore, the detected result for toluene in sample number BRW-SS01-S03 is qualified "R" as rejected and is unusable.

K.2 A discrepancy exists between the detected result for total xylene reported by the laboratory and the result calculated by the reviewer in sample number BRW-SS01-S01. The laboratory reported a detected result of 9 ppm and the reviewer calculated a result of 14 ppm. The difference may be due to the laboratory not including the result for o-xylene with the results for m & p-xylene.

K.3 Compound identification was confirmed using a second column and an alternate detector.

L. <u>Conclusion:</u>

L.1 Due to possible carryover of toluene from the previous sample, the detected result for toluene in sample BRW-SS01-S03 is qualified "R" as rejected and is unusable.

L.2 Due to the high percent RSDs in the initial calibration for certain analytes, select data are considered estimated and usable for limited purposes.

L.2 All other data are considered valid and usable for all purposes.

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DATA VALIDATION REPORT

PROGRAM: Point Barrow/DEW Line RI/FS (ICF Project No. 41096-412-02)
LABORATORY: Friedman & Bruya, Inc. (Seattle, WA)
REVIEWER: Keith Strout
ANALYSIS: HVOCs by USEPA Method 8010 and BTEX compounds by USEPA Method 8020
MATRIX: Soil
DATE: March 23, 1994

I. INTRODUCTION:

Friedman & Bruya, Inc. (FBI) (Seattle, WA) received 13 soil samples on August 27, 1993 to analyze for halogenated volatile organic compounds (HVOCs) and BTEX compounds by the volatile organics extraction method described in Section 8 of the Project Sampling and Analysis Plan. The samples were analyzed on August 29, 1993 for HVOCs by USEPA Method 8010, and BTEX compounds by USEPA Method 8020.

The ICF site identification numbers and corresponding FBI laboratory sample identification numbers are listed below.

ICF Site No.	Lab Sample No.	Matrix
BRW-BKGD-SD01	818	Soil
BRW-BKGD-S01	820	Soil
BRW-BKGD-S02	822	Soil
BRW-BKGD-S03	824	Soil
BRW-BKGD-S04	826	Soil
BRW-AOC2-SD01	828	Soil
BRW-AOC2-SD02	830	Soil
BRW-AOC2-SD03	832	Soil
BRW-AOC2-SD04	834	Soil
BRW-AOC2-SD05	836	Soil
BRW-AOC2-SD06	838	Soil
BRW-AOC2-SD07	840	Soil
BRW-AOC2-SD08	842	Soil

The following QC sample designations were included in project documentation: sample numbers BRW-AOC2-SD07 and BRW-AOC2-SD08 were designated as field replicates.

The analytical results were reported with an adjustment for moisture content.

It should be noted that all quantitation limits reported by the laboratory for HVOCs for project soil samples were higher than those specified in the Project Sampling and Analysis Plan. According to the laboratory, all soil samples were extracted in methanol before analysis, as required by the State of Alaska guidelines. It is the opinion of the reviewer that the quality of the data was not affected.

The analytical results with qualifications are presented on modified sample data sheets submitted by the laboratory. Definitions of the data qualifiers are listed in Table 1B. This report was prepared using the guidelines in the USEPA draft document "National Functional Guidelines for Organic Data Review" (December 1990), USEPA Method 8015M, and the Project Sampling and Analysis Plan.

II. VALIDITY & COMMENTS:

A. Technical Holding Times:

A.1 The technical holding time QC criteria were met for all project sample analyses.

B. Initial Calibration:

B.1 The laboratory analyzed a four point initial calibration on system 3-4 on August 24, 1993. The range of the initial calibration was from 1 ppb to 1000 ppb. All samples were quantitated using a linear regression curve calculated from the initial calibration. Percent relative standard deviations (%RSDs) were calculated for all compounds using the calibration factors from the initial calibration using the FID detector. The % RSDs for the following compounds exceeded the recommended QC criteria of 20.0%.

Compound	% RSD
toluene	26 %
ethylbenzene	53 %
m & p-xylene	41 %
o-xylene	28 %

Due to the large percent RSDs, the detected results for these compounds are qualified "J" as estimated and are usable for limited purposes.

C. Continuing Calibrations:

C.1 All QC criteria for the continuing calibrations were met and the results are considered acceptable.

D. Laboratory Blanks:

D.1 No target analytes were detected in the method blanks at a concentration above the PQL and the results are considered acceptable.

E. Instrument Blanks:

E.1 No target analytes were detected in the instrument blanks at a concentration above the PQL and the results are considered acceptable.

F. Field Replicate Analysis:

F.1 A QC limit for precision of ≤ 50%, as measured by Relative Percent Difference (RPD) between soil sample values, was specified for field replicate comparability.

F.2 Samples BRW-AOC2-SD07 and BRW-AOC2-SD08 were utilized for field replicate analysis. The results of the field replicate analyses met all applicable QC criteria and the results are considered acceptable.

G. Surrogate Recoveries:

G.1 All surrogate recoveries met applicable QC criteria and the results are considered acceptable.

H. Matrix Spike/Matrix Spike Duplicate Analyses:

H.1 The sample used for the matrix spike/matrix spike duplicate analyses (LON-SSO1-S10-4) was not sampled from the Point Barrow site. It was selected from the Point Lonely site. It is the opinion of the reviewer that the affect on the data quality is not known.

H.2 Discrepancies exist between the reported recoveries and the recoveries calculated by the reviewer for matrix spike compounds toluene and ethylbenzene. The laboratory applied an incorrect intercept value for the toluene quantitation and used the wrong peak area for the ethylbenzene quantitation. The laboratory used the m & p-xylene peak area for both the ethylbenzene and m & p-xylene quantitation. Listed below are the recoveries for these two compounds reported by the laboratory and calculated by the reviewer.

Compound	Laboratory Results		Validation Results	
	MS	MSD	MS	MSD
toluene	93	98	86	91
ethylbenzene	119	104	121	94

It is the opinion of the reviewer that since these analyses met all of the applicable QC criteria, the discrepancies will not affect the quality of the data.

H.3 The relative percent difference (RPD) for benzene in the matrix spike and matrix spike duplicate analyses was 36%, which exceeds the QC criteria of 25%. This is not expected to have an affect on the quality of the data.

H.4 All other QC criteria for project MS and MSD analyses were met and the results are considered acceptable.

I. System Performance:

I.1 The laboratory reported that data acquisition during the analysis of sample BRW-AOC2-SD03 (Lab No. 832) was interrupted and data for this sample was lost.The laboratory did not reanalyze this sample.

I.2 No problems with system performance were observed for all other project sample analyses.

J. Quantitation and Identification:

J.1 The reported PQLs for HVOC and BTEX compounds in samples BRW-BKGD-S03 and BRW-BKGD-S04 were incorrectly adjusted for moisture content. The PQLs for these samples have been corrected on the data forms by the reviewer.

J.2 Discrepancies exist between the detected results reported by the laboratory and the results regenerated by the reviewer for some of the project samples. Listed below are the sample results where discrepancies exist. Results are reported in parts per million (ppm).

ICF Site No.	Compound	Laboratory Results	Validation Results
BRW-AOC2-SD01	toluene	0.15	0.046
BRW-AOC2-SD02	ethylbenzene	0.6	1.4
	xylenes	1.9	2.6
BRW-AOC2-SD05	xylenes	2.2	3.3
BRW-AOC2-SD07	xylenes	5.0	6.5
BRW-AOC2-SD08	ethylbenzene	5.2	1.2
	xylenes	5.4	7.1

The laboratory's detected result for toluene in sample BRW-AOC2-SD01 was due to an incorrect intercept value used for quantitation. The laboratory's detected result for ethylbenzene in sample BRW-AOC2-SD02 was due to an incorrect adjustment for moisture. The laboratory indicated that the other discrepancies are probably due to inconsistent quantitation procedures. The laboratory could not reproduce some of the reported detected results which indicates that inconsistent quantitation procedures may have been employed. All adjustments have been made on the data forms by the reviewer.

J.3 Compound identification was confirmed using a second column and an alternate detector.

K. Conclusion:

K.1 Due to the high percent RSDs in the initial calibration for certain analytes, select data are considered estimated and usable for limited purposes.

K.2 All other data are considered valid and usable for all purposes.

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DATA VALIDATION REPORT

PROGRAM: Point Barrow/DEW Line RI/FS (ICF Project No. 41096-412-02)
LABORATORY: Friedman & Bruya, Inc. (Seattle, WA)
REVIEWER: Keith Strout
ANALYSIS: HVOCs by USEPA Method 8010 and BTEX compounds by USEPA Method 8020
MATRIX: Soil
DATE: April 5, 1994

I. INTRODUCTION:

Friedman & Bruya, Inc. (FBI) (Seattle, WA) received 16 soil samples from the Point Barrow site on August 27, 1993 (referenced chain of custody record No. 557). All of the soil samples required analysis for halogenated volatile organic compounds (HVOCs) and BTEX compounds by the volatile organics extraction method described in Section 8 of the Project Sampling and Analysis Plan. The samples were analyzed on September 2 and September 3, 1993 for HVOCs by USEPA Method 8010, and BTEX compounds by USEPA Method 8020.

The ICF site identification numbers and corresponding FBI laboratory sample identification numbers are listed below.

ICF Site No.	Lab Sample No.	Matrix
BRW-AOC2-S01	1122	Soil
BRW-AOC2-S02	1124	Soil
BRW-AOC2-S03	1126	Soil
BRW-AOC2-S04	1128	Soil
BRW-AOC2-S05	1130	Soil
BRW-AOC2-S06	1132	Soil
BRW-AOC2-S07	1134	Soil
BRW-SS01-SD01	1136	Soil
BRW-SS01-SD02	1138	Soil
BRW-SS01-SD03	1140	Soil
BRW-SS01-SD04	1142	Soil

BRW-SS01-SD05	1144	Soil
BRW-SS02-SD01	1146	Soil
BRW-SS02-S01	1148	Soil
BRW-SS02-S02	1150	Soil
BRW-SS02-S03	1152	Soil

The following QC sample designations were included in project documentation: sample numbers BRW-AOC2-S06 and BRW-AOC2-S07 were designated as field replicates.

The analytical results with qualifications are presented on modified sample data sheets submitted by the laboratory. Definitions of the data qualifiers are listed in Table 1B. This report was prepared using the guidelines in the USEPA draft document "National Functional Guidelines for Organic Data Review" (December 1990), USEPA Method 8015M, and the Project Sampling and Analysis Plan.

The analytical results were reported with an adjustment for moisture content.

It should be noted that all quantitation limits reported by the laboratory for HVOCs for project soil samples were higher than those specified in the Project Sampling and Analysis Plan. According to the laboratory, all soil samples were extracted in methanol before analysis, as required by the State of Alaska guidelines. It is the opinion of the reviewer that the quality of the data was not affected.

II. VALIDITY & COMMENTS:

A. Technical Holding Times:

A.1 The technical holding time QC criteria were met for all project sample analyses.

B. Initial Calibration:

B.1 The laboratory analyzed a five point initial calibration on system 1-2 on August 19, 1993. The range of the initial calibration was from 1 ppb to 1000 ppb. All samples were quantitated using a linear regression curve calculated from the initial calibration. Percent relative standard deviations (%RSDs) were calculated for all compounds using the calibration factors from the initial calibration using the FID detector. The % RSDs for the following compounds exceeded the recommended QC criteria of 20.0%.

Compound	% RSD
benzene	28.3 %
o-xylene	26.5 %

Due to the large percent RSDs, the detected results for these compounds in all project samples are qualified "J" as estimated and are usable for limited purposes.

B.2 The laboratory was unable to demonstrate linearity throughout the quantitation range using the ECD detector because the detector was saturated at low concentrations. It is the opinion of the reviewer that the ECD detector can be used

only to confirm the presence of the halogenated compounds. Quantitation of the halogenated compounds should have been done on the PID or FID detector when possible, and only if compound detection was confirmed on the ECD.

C. Continuing Calibrations:

C.1 The continuing calibrations were performed at a concentration of 500 ppb. At this concentration, the ECD response for all of the halogenated compounds is saturated. Therefore, the ECD detector should only be used to confirm the presence of the halogenated compounds.

C.2 All other QC criteria for the continuing calibrations were met and the results are considered acceptable.

D. Laboratory Blanks:

D.1 No target analytes were detected in the method blanks at a concentration above the practical quantitation limit (PQL) and the results are considered acceptable.

E. Instrument Blanks:

E.1 No target analytes were detected in the instrument blanks at a concentration above the PQL and the results are considered acceptable.

F. Field Blanks:

F.1 There were no field blanks submitted for analysis with this project sample set.

G. Field Replicate Analysis:

G.1 A QC limit for precision of $\leq$ 50%, as measured by Relative Percent Difference (RPD) between soil sample values, was specified for field replicate comparability.

G.2 Samples BRW-AOC2-S06 and BRW-AOC2-S07 were utilized for field replicate analysis. The results of the field replicate analyses met all applicable QC criteria and the results are considered acceptable.

H. Surrogate Recoveries:

H.1 The laboratory calculated some of the surrogate recoveries using the PID and the remainder using the FID.

H.2 All surrogate recoveries met applicable QC criteria and the results are considered acceptable.

I. Matrix Spike/Matrix Spike Duplicate Analyses:

I.1 Sample number BRW-SS02-S02 was used for the matrix spike/matrix spike duplicate analyses.

I.2 All of the matrix spike/matrix spike duplicate QC criteria were met and the results are considered acceptable.

J. System Performance:

J.1 It is the opinion of the reviewer that the ECD detector cannot be used for the quantitation of the halogenated compounds because the detector displayed saturation at low concentrations. The ECD detector can be used for halogenated compound identification confirmation.

J.2 No other problems with system performance were observed for the project samples.

K. Quantitation and Identification:

K.1 The laboratory reported detected results for target analytes in several of the samples for which the confirmation detectors provide no evidence that these compounds are present above the PQLs. The detected results reported by the laboratory for which there is no supporting confirmation are listed below.

ICF Sample No.	Target Compound	Reported Concentration (ppm)
BRW-AOC2-S03	1,1,1-trichloroethane	0.4
	carbon tetrachloride	0.13
BRW-AOC2-S04	1,1,1-trichloroethane	0.3
	ethylbenzene	0.03
	total xylene	0.1
BRW-AOC2-S07	1,1,1-trichloroethane	0.2
BRW-SS01-SD01	carbon tetrachloride	0.1
	trichloroethene	0.2
	tetrachloroethene	6.4

Since the PID detector did not show any response for these compounds and the ECD detector did not show any response above background levels for the halogenated compounds, it is the opinion of the reviewer that these compounds are not present in the samples above the PQLs. Therefore, the detected results for these compounds in the above listed samples have been changed on the data summary forms to reflect that they were not detected at concentrations above the PQLs.

K.2 Discrepancies exist between the detected results for total xylene reported by the laboratory and the results regenerated by the reviewer for two of the project samples. Listed below are the sample results where discrepancies exist. Results are reported in parts per million (ppm).

ICF Site No.	Laboratory Results	Validation Results
BRW-AOC2-S05	0.18	0.28
BRW-SS02-S01	1.2	6.9

It appears that the laboratory may not have included the detected results for o-xylene

along with the detected results for m & p-xylene in the above listed samples.

K.3 Compound identification was confirmed using a second column and an alternate detector.

L. Conclusion:

L.1 Due to the high percent RSDs in the initial calibration for certain analytes, select data are considered estimated and usable for limited purposes.

L.2 Due to the lack of confirmation on alternate detectors, the detected results for certain compounds in some samples have been changed to reflect that they are not present at concentrations above the PQLs.

L.3 All other data are considered valid and usable for all purposes.

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DATA VALIDATION REPORT

PROGRAM:	Point Barrow/DEW Line RI/FS (ICF Project No. 41096-412-02)
LABORATORY:	Friedman & Bruya, Inc. (Seattle, WA)
REVIEWER:	Keith Strout
ANALYSIS:	HVOCs by USEPA Method 8010 and BTEX compounds by USEPA Method 8020
MATRIX:	Water
DATE:	March 31, 1994

I. INTRODUCTION:

Friedman & Bruya, Inc. (FBI) (Seattle, WA) received 11 water samples on August 26, 1993 to analyze for halogenated volatile organic compounds (HVOCs) and BTEX compounds by the volatile organics extraction method described in Section 8 of the Project Sampling and Analysis Plan. The samples were analyzed on August 27, 1993 for HVOCs by USEPA Method 8010, and BTEX compounds by USEPA Method 8020.

The ICF site identification numbers and corresponding FBI laboratory sample identification numbers are listed below.

ICF Site No.	Lab Sample No.	Matrix
BRW-TB01	776	Water
BRW-BKGD-SW01	780	Water
BRW-BKGD-SW02	786	Water
BRW-AOC2-SW01	794	Water
BRW-AOC2-SW02	798	Water
BRW-AOC2-SW03	800	Water
BRW-AOC2-SW04	804	Water
BRW-AOC2-SW05	806	Water
BRW-AOC2-SW06	810	Water
BRW-AOC2-SW07	812	Water
BRW-AOC2-SW08	814	Water

The following QC sample designations were included in project documentation: sample numbers BRW-AOC2-SW04 and BRW-AOC2-SW08 were designated as field duplicates and

sample number BRW-TB01 was designated as a travel blank.

The analytical results with qualifications are presented on modified sample data sheets submitted by the laboratory. Definitions of the data qualifiers are listed in Table 1B. This report was prepared using the guidelines in the USEPA draft document "National Functional Guidelines for Organic Data Review" (December 1990), USEPA Method 8015M, and the Project Sampling and Analysis Plan.

II. VALIDITY & COMMENTS:

A. Technical Holding Times:

A.1 The technical holding time QC criteria were met for all project sample analyses.

B. Initial Calibration:

B.1 The laboratory analyzed a five point initial calibration on system 1-2 on August 19, 1993. The range of the initial calibration was from 1 ppb to 1000 ppb. All samples were quantitated using a linear regression curve calculated from the initial calibration. Percent relative standard deviations (%RSDs) were calculated for all compounds using the calibration factors from the initial calibration using the FID detector. The % RSDs for the following compounds exceeded the recommended QC criteria of 20.0%.

Compound	% RSD
benzene	28.3 %
o-xylene	26.5 %

Due to the large percent RSDs, the detected results for these compounds in all of the project samples are qualified "J" as estimated and are usable for limited purposes.

C. Continuing Calibrations:

C.1 The percent recovery for toluene in the continuing calibrations performed on system 1-2 on August 27, 1993 was 145% which exceeds the QC criteria of 75-125%. The detected results and the practical quantitation limit PQL for toluene in all samples and blanks analyzed on system 1-2 are qualified "J" as estimated and are usable for limited purposes.

C.2 All other QC criteria for the continuing calibrations were met and the results are considered acceptable.

D. Laboratory Blanks:

D.1 No target analytes were detected in the method blanks at a concentration above the PQL and the results are considered acceptable.

E. Instrument Blanks:

E.1 No target analytes were detected in the instrument blanks at a concentration above the PQL and the results are considered acceptable.

F. Field Blanks:

F.1 No target analytes were detected in the travel blank at a concentration above the PQL and the results are considered acceptable.

G. Field Duplicate Analysis:

G.1 A QC limit for precision of ≤ 20%, as measured by Relative Percent Difference (RPD) between water sample values, was specified for field duplicate comparability.

G.2 Samples BRW-AOC2-SW04 and BRW-AOC2-SW08 were utilized for field duplicate analysis. The results of the field duplicate analyses met all applicable QC criteria and the results are considered acceptable.

H. Surrogate Recoveries:

H.1 All surrogate recoveries met applicable QC criteria and the results are considered acceptable.

I. Matrix Spike/Matrix Spike Duplicate Analyses:

I.1 The laboratory did not submit any matrix spike/matrix spike duplicate analyses with this project sample set.

J. System Performance:

J.1 No problems with system performance were observed for all project sample analyses.

K. Quantitation and Identification:

K.1 The laboratory did not submit the raw data for sample BRW-AOC2-SW07 (FBI #812). The laboratory was requested to supply all of the raw data for this sample, but they have indicated that they are unable to locate either the hardcopy or electronic data for this sample. Therefore, the detected results and the PQLs for all compounds in sample BRW-AOC2-SW07 are qualified "R" as rejected and are unusable.

K.2 Compound identification was confirmed using a second column and an alternate detector.

L. Conclusion:

L.1 Due to the laboratory's inability to supply the raw data for sample BRW-AOC2-SW05, the detected results and PQLs for all compounds in this sample are qualified "R" as rejected and are unusable.

L.2 Due to the high percent RSDs in the initial calibration for certain analytes, select data are considered estimated and usable for limited purposes.

L.3 Due to the high percent recovery for toluene in the continuing calibrations performed on August 27, 1993 on system 1-2, the detected results and the PQL for toluene in all of the samples and blanks are qualified "J" as estimated and are usable for limited purposes.

L.4 All other data are considered valid and usable for all purposes.

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DATA VALIDATION REPORT

PROGRAM:	POINT BARROW / DEW Line RI/FS (ICF Project No. 41096-412-02)
LABORATORY:	Friedman & Bruya, Inc. (Seattle, WA)
REVIEWER:	Timothy Vonnahme
ANALYSIS:	Pesticides by USEPA Method 8080.
MATRIX:	Water
DATE:	March 30, 1994

I. INTRODUCTION:

Friedman & Bruya, Inc. (Seattle, WA) received 10 water samples from the Point Barrow site on August 27, 1993 (referenced chain of custody record No. 556). One sample was requested for pesticide analysis by the pesticide organics extraction method described in Section 8 of the Project Sampling and Analysis Plan. The samples were analyzed for pesticides by USEPA Method 8080 for pesticides on September 3, 1993.

The ICF site identification number and corresponding FBI laboratory sample identification number is listed below.

ICF Site No.	Lab Sample No.	Matrix
BRW-EB01	1156	Water

It should be noted that the practical quantitation limits (PQLs) reported by the laboratory (0.2 ppb) for pesticides for the project water sample were lower than those specified in the Project Sampling and Analysis Plan (0.5 ppb) with the exception of chlordane (10.0 ppb) and methoxychlor (2.0 ppb). Since the lowest initial calibration standard is (0.01 ppm) all PQLs should be raised to 0.5 ppb.

The analytical results with qualifications are presented on modified sample data sheets submitted by the laboratory. Definitions of the data qualifiers are listed in Table 1B. This report was prepared in accordance with the USEPA draft document " National Functional Guidelines for Organic Data Review", December 1990, and the analytical guidelines in USEPA Method 8080, and the Project Sampling and Analysis Plan.

II. VALIDITY & COMMENTS:

A. Technical Holding Times:

A.1 Technical Holding time QC criteria were met for all project sample analyses.

B. Initial Calibration:

B.1 The laboratory performed a five point initial calibration on GC instrument ICF5 on August 21,1993. The range of the initial calibration was from 0.01 ppm to 1.0 ppm. The percent relative standard deviations (%RSDs) were calculated for all compounds using calibration factors determined from the initial calibration using the EC detector. The %RSD for the following target analyte exceeded the recommended QC criteria of 20.0%

Compound	%RSD
beta-BHC	22%

B.2 Chlordane and methoxychlor could not be calculated due to low sensitivity and interferences. All detected results for these compounds are qualified "R" as rejected.

B.3 Due to the large percent RSD in the analyte listed above, the detected results for this compound is qualified "J" as estimated and usable for limited purposes.

C. Continuing Calibration:

C.1 Chlordane and methoxychlor percent recoveries could not be calculated due to low sensitivity and interference problems. All detected results and PQLs for these compounds are qualified "R" as rejected.

C.2 All QC criteria for the pesticides were met except for the following analytes.

Compound	%R	QC Criteria
Endosulfan I	139%	75-125
Endrin/4,4'-DDD	153%	75-125

C.3 The results for the above two analytes were outside the QC criteria, therefore all detected results and PQLs are qualified "J" as estimated and usable for limited purposes.

D. Laboratory Blanks:

D.1 Target analytes were not detected in the method blank associated with the samples at a concentration above the practical quantitation limits (PQL), and the results are considered acceptable.

E. Instrument Blanks:

E.1 Target analytes were not detected in the instrument blank associated with the samples at a concentration above the estimated practical quantitation limits (PQL), and the results are considered acceptable.

F. Field Blanks:

F.1 Target analytes were not detected in the equipment blank at a concentration above the PQL and the results are considered acceptable.

G. Field Duplicate Analyses:

G.1 No Field Duplicate Analyses were requested for the pesticide fraction.

H. Surrogate Recoveries:

H.1 Surrogate percent recovery (%R) for project analyses were met for all project samples using the surrogate areas from the closest continuing calibration standard. Since the recovery met applicable QC criteria, the surrogate recovery results are considered acceptable.

I. Matrix Spike/Matrix Spike Duplicate:

I.1 No matrix spike and matrix spike duplicate analyses were performed for this sample set.

J. System Performance:

J.1 No problems with system performance were observed for all other project sample analyses.

K. Quantitation and Identification:

K.1 No target analytes were detected in the sample.

K.2 The PQLs reported by the laboratory are incorrect. The PQLs for these analytes have been corrected on the summary data form by the reviewer.

L. Conclusion:

L.1 Due to low sensitivity and interferences detected in the initial calibration and continuing calibration, the PQLs for chlordane and methoxychlor are qualified "R" and rejected .

L.2 Due to continuing calibration problems, the PQLs for Endosulfan I and Endrin and 4,4'-DDD are qualified "J" as estimated .

L.3 Due to the laboratory reporting incorrect quantitation limits, all PQLs were raised to 0.5 ppb.

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DATA VALIDATION REPORT

PROGRAM: POINT BARROW / DEW Line RI/FS (ICF Project No. 41096-412-02)
LABORATORY: Friedman & Bruya, Inc. (Seattle, WA)
REVIEWER: Timothy Vonnahme
ANALYSIS: Pesticides by USEPA Method 8080.
MATRIX: Soil
DATE: March 24, 1994

I. INTRODUCTION:

Friedman & Bruya, Inc. (Seattle, WA) received 7 soil samples from the Point Barrow site (referenced chain of custody record No. 551) on August 27, 1993 for pesticide analysis by the pesticide organics extraction method described in Section 8 of the Project Sampling and Analysis Plan. The samples were analyzed for pesticides by USEPA Method 8080 for pesticides on August 28 and August 29, 1993.

The ICF site identification numbers and corresponding FBI laboratory sample identification numbers are listed below.

ICF Site No.	Lab Sample No.	Matrix
BRW-BKGD-SD01	818	Soil
BRW-BKGD-S01	820	Soil
BRW-BKGD-S02	822	Soil
BRW-BKGD-S03	824	Soil
BRW-BKGD-S04	826	Soil
BRW-AOC2-SD07	840	Soil
BRW-AOC2-SD08	842	Soil

The following QC sample designations were included in project documentation: sample numbers BRW-AOC2-SD07 and BRW-AOC2-SD08 were designated as field replicates.

The analytical results were reported with an adjustment for moisture content.

It should be noted that the quantitation limits reported by the laboratory for pesticides for project soil samples were lower than those specified in the Project Sampling and Analysis Plan with the exception of chlordane (0.5 ppm) and methoxychlor (0.1 ppm).

The analytical results with qualifications are presented on modified sample data sheets submitted by the laboratory. Definitions of the data qualifiers are listed in Table 1B. This report was prepared in accordance with the USEPA draft document " National Functional Guidelines for Organic Data Review", December 1990, and the analytical guidelines in USEPA Method 8080, and the Project Sampling and Analysis Plan.

II. VALIDITY & COMMENTS:

A. Technical Holding Times:

A.1 Technical Holding time QC criteria were met for all project sample analyses.

B. Initial Calibration:

B.1 The laboratory performed a five point initial calibration on GC System #6 on August 21, 1993. The range of the initial calibration was from 0.01 ppm to 1.0 ppm. Percent relative standard deviations (%RSDs) were calculated for all compounds using calibration factors determined from the initial calibration using the EC detector. The %RSDs for the following target analytes exceeded the recommended QC criteria of 20.0%

Compound	%RSD
Endosulfan II	38%
Endrin Aldehyde	31%
DDT/Endo. Sulfate	32%

B.2 Due to the large percent RSDs, the detected results for these compounds are qualified "J" as estimated and are usable for limited purposes.

B.3 Methoxychlor was spiked in at concentrations too low to be detected by the ECD. All PQLs for this analyte are qualified "R" as rejected.

C. Continuing Calibration:

C.1 No continuing calibrations were analyzed during the sequence with the exception of the column degradation solution containing Endrin and DDT. The stability of the instrument, GC column, and detector were monitored using the Endrin and DDT column degradation solution and the Aroclor 1254 continuing calibration solution. These two solutions were used to check area consistency and surrogate area stability. It is the opinion of the reviewer, that since no pesticide continuing calibration solutions were analyzed, this is the only criteria that can be used to monitor system performance.

C.2 Due to the absence of pesticide continuing calibrations, the PQLs for all

blanks and samples are qualified "J" as estimated and usable for limited purposes.

D. Laboratory Blanks:

D.1 The baseline dropped below zero during analyses, as can be seen on the chromatogram by the straight baseline at zero millivolts. In the opinion of the reviewer this will not affect the quality of the data.

D.2 Target analytes were not detected in the method blank associated with the samples at a concentration above the practical quantitation limits (PQL), and the results are considered acceptable.

E. Instrument Blanks:

E.1 Target analytes were not detected in the instrument blank associated with the samples at a concentration above the estimated practical quantitation limits (PQL), and the results are considered acceptable.

F. Field Replicate Analyses:

F.1 A QC limit for precision of ≤50 percent as measured by Relative Percent Difference (RPD) between soil sample values, was specified for field replicate comparability.

F.2 Samples BRW-AOC2-SD07 and BRW-AOC2-SD08 were utilized for field replicate analyses. The results met all applicable QC criteria, and the results are considered acceptable.

G. Surrogate Recoveries:

G.1 Surrogate spike percent recoveries (%Rs) for project analyses were met for all project samples using the surrogate areas from the closest continuing calibration standard. However, the exact percent recovery reported by the laboratory could not be verified because the laboratory used an average of the surrogate areas from an unknown number of continuing calibration standards to calculate the surrogate recoveries. Calculating the surrogate recoveries referenced against the closest continuing calibration standards yielded recoveries within the QC criteria, but different than what the laboratory had reported. The surrogate recoveries reported by the laboratory and the values reported by the reviewer are listed below.

ICF Sate No.	Laboratory Results	Validation Results
BRW-BKGD-SD01	102%	80%
BRW-BKGD-S01	107%	88%
BRW-BKGD-S02	106%	100%
BRW-BKGD-S03	100%	86%
BRW-BKGD-S04	96%	82%
BRW-AOC2-SD01	107%	88%
BRW-AOC2-SD02	78%	97%
BRW-AOC2-SD03	94%	78%
BRW-AOC2-SD04	98%	77%

BRW-AOC2-SD05	100%	82%
BRW-AOC2-SD06	98%	82%
BRW-AOC2-SD07	93%	76%
BRW-AOC2-SD08	104%	83%

G.2 Since all recoveries met applicable QC criteria, the surrogate recovery results are considered acceptable.

H. Matrix Spike/Matrix Spike Duplicate:

H.1 No matrix spike and matrix spike duplicate analyses were performed for this sample set.

I. System Performance:

I.1 The laboratory set up the GC analytical run time to elute all pesticide analytes within 9 minutes, causing co-elution of numerous pesticides, making identification difficult. A slower temperature program and/or slower carrier gas flow rate would increase resolution for many of the pesticide analytes.

I.2 The Endrin and 4,4'-DDT breakdown ranged between 5-30%. It is the opinion of the reviewer that the quality of the data was not affected.

I.3 No problems with system performance were observed for all other project sample analyses.

J. Quantitation and Identification:

J.1 The reported PQLs in some of the samples were not adjusted for moisture content. The PQLs for these samples have been corrected on the data forms by the reviewer.

J.2 Samples BRW-AOC2-SD01, BRW-AOC2-SD02, BRW-AOC2-SD03, BRW-AOC2-SD05, BRW-AOC2-SD07, and BRW-AOC2-SD08, exhibited raised baselines in the retention time windows of some of the pesticides, which in the opinion of the laboratory and reviewer are of biogenic origin. Pesticides were not detected in any of these samples.

J.3 Although not requested on the chain-of-custody record, pesticide analysis was reported by the laboratory for samples BRW-AOC2-SD03, BRW-AOC2-SD03, BRW-AOC2-SD04, and BRW-AOC2-SD06. The results of these analyses were not validated.

K. Conclusion:

K.1 The PQLs for methoxychlor in all blanks and samples are rejected because the analyte concentrations in the initial calibration were too low.

K.2 Due to the absence of pesticide continuing calibrations, all PQLs for all project blanks and samples are qualified "J" as estimated and usable for limited purposes.

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DATA VALIDATION REPORT

PROGRAM: POINT BARROW / DEW Line RI/FS (ICF Project No. 41096-412-02)
LABORATORY: Friedman & Bruya, Inc. (Seattle, WA)
REVIEWER: Timothy Vonnahme
ANALYSIS: Pesticides by USEPA Method 8080.
MATRIX: Water
DATE: March 31, 1994

I. INTRODUCTION:

Friedman & Bruya, Inc. (Seattle, WA) received 11 water samples from the Point Barrow site (referenced chain of custody record No. 552) on August 26, 1993. Two samples were requested for pesticide analysis by the pesticide organics extraction method described in Section 8 of the Project Sampling and Analysis Plan. The samples were analyzed for pesticides by USEPA Method 8080 on September 3, 1993.

The ICF site identification numbers and corresponding FBI laboratory sample identification numbers are listed below.

ICF Site No.	Lab Sample No.	Matrix
BRW-BKGD-SW01	784	Water
BRW-BKGD-SW02	884	Water

It should be noted that the practical quantitation limits (PQLs) reported by the laboratory (0.2 ppb) for pesticides for the project water sample were lower than those specified in the Project Sampling and Analysis Plan (0.5 ppb) with the exception of chlordane (10.0 ppb) and methoxychlor (2.0 ppb). Since the lowest initial calibration standard is (0.01 ppm) all PQLs should be raised to 0.5 ppb.

The instrument Number-Sequence Date on the Summary Form for Sample BRW-BKGD-SW01 (784) and BRW-BKGD-SW02 (884) were recorded as ICF6 09-03-93. It is the opinion of the reviewer that the pesticide analyses should be reported using ICF5 09-03-93 because this instrument used the same instrument methods for both the standards and samples, whereas ICF6 used two different instrument methods, employing two different GC temperature programs. The initial calibration using instrument ICF5 was also superior to the initial calibration performed on instrument ICF6.

The analytical results with qualifications are presented on modified sample data sheets submitted by the laboratory. Definitions of the data qualifiers are listed in Table 1B. This report was prepared in accordance with the USEPA draft document " National Functional Guidelines for Organic Data Review", December 1990, and the analytical guidelines in USEPA Method 8080, and the Project Sampling and Analysis Plan.

II. <u>VALIDITY & COMMENTS:</u>

A. <u>Technical Holding Times:</u>

A.1 Technical Holding time QC criteria were met for all project sample analyses.

B. <u>Initial Calibration:</u>

B.1 The laboratory performed a five point initial calibration on GC instrument ICF5 on August 21,1993. The range of the initial calibration was from 0.01 ppm to 1.0 ppm. The percent relative standard deviations (%RSDs) were calculated for all compounds using calibration factors determined from the initial calibration using the EC detector. The %RSD for the following target analyte exceeded the recommended QC criteria of 20.0%

Compound	%RSD
beta-BHC	22%

B.2 Chlordane and methoxychlor could not be calculated due to low sensitivity and interferences. All detected results for these compounds are qualified "R" as rejected.

B.3 Due to the large percent RSD in the analyte listed above, the detected results for this compound is qualified "J" as estimated and usable for limited purposes.

C. <u>Continuing Calibration:</u>

C.1 Chlordane and methoxychlor percent recoveries could not be calculated due to low sensitivity and interference problems. All detected results and PQLs for these compounds are qualified "R" as rejected.

C.2 All QC criteria for the pesticides were met except for the following analytes.

Compound	%R	QC Criteria
Endosulfan I	139%	75-125
Endrin/4,4'-DDD	153%	75-125

C.3 The results for the above two analytes were outside the QC criteria, therefore all detected results and PQLs are qualified "J" as estimated and usable for limited purposes.

D. <u>Laboratory Blanks:</u>

D.1 Target analytes were not detected in the method blank associated with the samples at a concentration above the practical quantitation limits (PQLs), and the

results are considered acceptable.

E. Instrument Blanks:

E.1 Target analytes were not detected in the instrument blank associated with the samples at a concentration above the PQ Ls, and the results are considered acceptable.

F. Field Blanks:

F.1 There were no field blank submitted for analyses with the project sample set.

G. Field Duplicate Analyses:

G.1 No field duplicate analyses were requested for the pesticide fraction.

H. Surrogate Recoveries:

H.1 Surrogate percent recovery (%R) for project analyses were met for all project samples using the average surrogate areas from the initial calibration. Since the recovery met applicable QC criteria, the surrogate recovery results are considered acceptable.

I. Matrix Spike/Matrix Spike Duplicate:

I.1 No matrix spike and matrix spike duplicate analyses were performed for this sample set.

J. System Performance:

J.1 In the opinion of the reviewer, the results from GC instrument ICF5 should have been reported instead of GC instrument ICF6, due to superior initial and continuing calibration results.

J.2 No other problems with system performance were observed for all other project sample analyses.

K. Quantitation and Identification:

K.1 No target analytes were detected in the samples. The PQLs of the target analytes reported by the laboratory are incorrect. The PQLs have been corrected on the summary data form by the reviewer.

L. Conclusion:

L.1 Due to low sensitivity and interferences detected in the initial calibration and continuing calibration, the PQLs for chlordane and methoxychlor are qualified "R" and rejected .

L.2 Due to continuing calibration problems, the PQLs for Endosulfan I and Endrin and 4,4'-DDD are qualified "J" as estimated .

L.3 All PQLs were raised to 0.5 ppb due to the laboratory reporting incorrect detection limits.

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DATA VALIDATION REPORT

PROGRAM: POINT BARROW / DEW Line RI/FS (ICF Project No. 41096-412-02)
LABORATORY: Friedman & Bruya, Inc. (Seattle, WA)
REVIEWER: Timothy Vonnahme
ANALYSIS: Pesticides by USEPA Method 8080.
MATRIX: Soil
DATE: April 7, 1994

I. INTRODUCTION:

Friedman & Bruya, Inc. (Seattle, WA) received 16 soil samples from the Point Barrow site on August 27, 1993 (referenced chain of custody record No. 557). Three samples were requested for pesticide analysis by the pesticide organics extraction method described in Section 8 of the Project Sampling and Analysis Plan. The samples were analyzed for pesticides by USEPA Method 8080 on August 31, and September 1 and 3, 1993.

The ICF site identification numbers and corresponding FBI laboratory sample identification numbers are listed below.

ICF Site No.	Lab Sample No.	Matrix
BRW-SS01-SD01	1136	Soil
BRW-SS02-SD01	1146	Soil
BRW-SS02-S01	1148	Soil

The analytical results were reported with an adjustment for moisture content.

The instrument Number-Sequence Date on the Summary Form for all three samples was were inadvertently recorded by the laboratory as ICF6 09-03-93 instead of ICF5 08-31-93. The laboratory stated that GC instrument ICF6 is used only for second column confirmation of detected target analytes.

The analytical results with qualifications are presented on modified sample data sheets submitted by the laboratory. Definitions of the data qualifiers are listed in Table 1B. This report was prepared in accordance with the USEPA draft document " National Functional Guidelines for Organic Data Review", December 1990, and the analytical guidelines in USEPA Method 8080, and the Project Sampling and Analysis Plan.

II. VALIDITY & COMMENTS:

A. Technical Holding Times:

A.1 The technical holding time QC criteria were met for all project sample analyses.

B. Initial Calibration:

B.1 The laboratory performed a five point initial calibration on GC instrument ICF5 on August 21,1993. The range of the initial calibration was from 0.01 ppm to 1.0 ppm. All samples were quantitated using a linear regression curve calculated from the initial calibration. The percent relative standard deviations (%RSDs) were calculated for all compounds using calibration factors determined from the initial calibration using the EC detector. The %RSD for the following target analyte exceeded the recommended QC criteria of 20.0%

Compound	%RSD
beta-BHC	22%

Due to the large percent RSD in the analyte listed above, the detected result for this compound is qualified "J" as estimated and usable for limited purposes.

B.2 Chlordane and methoxychlor could not be calculated due to low sensitivity and interference. All detected results for these compounds are qualified "R" as rejected.

C. Continuing Calibration:

C.1 Chlordane and methoxychlor percent recoveries could not be calculated due to low sensitivity and interference problems. All detected results and PQLs for these compounds are qualified "R" as rejected.

C.2 The continuing calibration standard exhibited low sensitivity for all pesticide analytes causing all analytes to be outside the QC criteria. Therefore, all detected results and practical quantitation limits (PQLs) are qualified "J" as estimated and usable for limited purposes.

D. Laboratory Blanks:

D.1 Target analytes were not detected in the method blank at a concentration above the PQL, and the results are considered acceptable.

E. Instrument Blanks:

E.1 Target analytes were not detected in the instrument blank associated with the samples at a concentration above the PQL, and the results are considered acceptable.

F. Field Blanks:

F.1 There was no field blank submitted for analyses with the project sample set.

G. Field Replicate Analyses:

G.1 No field replicate analyses were requested for the pesticide fraction.

H. Surrogate Recoveries:

H.1 Due to co-elution of target analytes and hydrocarbon interference on the primary GC column, sample BRW-SS02-S02 displayed a surrogate recovery exceeding QC criteria.

H.2 The laboratory calculated the surrogate recoveries on the confirmation column, referencing the closest continuing standard. Using this procedure all QC criteria were met.

H.3 All surrogate recoveries calculated from the confirmation GC column met applicable QC criteria, and the results are considered acceptable.

I. Matrix Spike/Matrix Spike Duplicate:

I.1 No matrix spike and matrix spike duplicate analyses were performed for this project sample set.

J. System Performance:

J.1 The laboratory set up the GC analytical run time on the primary GC column to elute all pesticide analytes within 9 minutes, causing co-elution of numerous pesticides, and making identification difficult. A slower temperature program and/or slower carrier gas flow rate would increase resolution for many of the pesticide analytes.

J.2 It is the opinion of the reviewer that a longer bakeout time should have been used to further clean the GC column and detector between sample analyses.

J.3 The Endrin and 4,4'-DDT breakdown ranged between 5-20%, and the results are considered acceptable.

J.4 No other problems with system performance were observed for all other project sample analyses.

K. Quantitation and Identification:

K.1 The laboratory reported endosulfan sulfate at a concentration of 0.02 ppm in sample BRW-SS01-SD01. It is the opinion of the reviewer that due to coelution problems on the primary GC column, retention time discrepancies on the confirmation GC column, and the very low concentration reported (PQL=0.01 ppm), endosulfan sulfate is not detected in the sample. The PQL for this target analyte has been inserted on the summary data form by the reviewer.

K.2 No other problems with quantitation and identification were observed.

L. Conclusion:

L.1 Endosulfan sulfate was reported in sample BRW-SS01-SD01 at a concentration of 0.02 ppm by the laboratory, but was changed to a PQL of <0.01 ppm by the reviewer for reasons stated in Section K.1.

L.2 Due to low sensitivity and hydrocarbon interference detected in the initial calibration and continuing calibration, the PQL for chlordane and methoxychlor for all project samples are qualified "R" as rejected and unusable.

L.2 Due to continuing calibration problems, the PQLs for all target analytes are qualified "J" as estimated and usable for limited purposes.

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DATA VALIDATION REPORT

PROGRAM:	POINT BARROW / DEW Line RI/FS (ICF Project No. 41096-412-02)
LABORATORY:	Friedman & Bruya, Inc. (Seattle WA)
REVIEWER:	Timothy Vonnahme
ANALYSIS:	Polychlorinated Biphenyls (PCBs) by USEPA Method 8080.
MATRIX:	Water
DATE:	March 29, 1994

I. INTRODUCTION:

Friedman & Bruya, Inc. (FBI) (Seattle, WA) received 10 water samples from the Point Barrow site on August 27, 1993 (referenced chain of custody record No. 556). One sample was requested for polychlorinated biphenyls (PCBs) analysis by the PCB organics extraction method described in Section 8 of the Project Sampling and Analysis Plan. The sample was analyzed for PCBs by USEPA Method 8080 (GC/ECD) on September 3, 1993.

The ICF site identification number and corresponding FBI laboratory sample identification number are listed below.

ICF Site No.	Lab Sample No.	Matrix
BRW-EB01	1156	Water

The laboratory reported incorrect Practical Quantitation Limits (PQLs) of 2.0 ppb for the sample when the correct PQL should have been 5.0 ppb, since the low point on the initial calibration curve is 0.1 ppm.

The analytical results with qualifications are presented on modified sample data sheets submitted by the laboratory. Definitions of the data qualifiers are listed in Table 1B. This report was prepared in accordance with the USEPA draft document " National Functional Guidelines for Organic Data Review", December 1990, and the analytical guidelines in USEPA Method 8080, and the Project Sampling and Analysis Plan.

II. VALIDITY & COMMENTS:

A. Technical Holding Times:

A.1 Technical Holding time QC criteria were met for all project sample analyses.

B. Initial Calibration:

B.1 The laboratory performed a five point initial calibration on GC Instrument ICF5 on August 21, 1993. All samples were quantitated using a linear regression curve calculated from the initial calibration. The range of the initial calibration was from 0.1 ppm to 10 ppm. A percent relative standard deviation (%RSD) of 37.2% was calculated using calibration factors determined from the initial calibration. The %RSD of 37.2 exceeds the recommended method criteria of 20.0%, therefore, the detected results are qualified "J" as estimated and usable for limited purposes.

C. Continuing Calibration:

C.1 All QC criteria for the continuing calibrations were met and the results are considered acceptable.

D. Laboratory Blanks:

D.1 PCBs were not detected in the method blank associated with the samples at a concentration above the practical quantitation limits (PQL) and the results are considered acceptable.

E. Instrument Blanks:

E.1 No target analytes were detected at a concentration above the PQL and the results are considered acceptable.

F. Field Blanks:

F.1 PCBs were not detected in the equipment blank at a concentration above the PQL and the results are considered acceptable.

G. Field Duplicate Analyses:

G.1 No Field Duplicate Analyses were requested for the PCB fraction.

H. Surrogate Recoveries:

H.1. The surrogate recoveries met applicable QC criteria and the results are considered acceptable.

I. Matrix Spike/Matrix Spike Duplicate:

I.1 The laboratory did not perform any matrix spike/matrix spike duplicate analyses for the PCB fraction.

J. System Performance:

J.1 The results for sample BRW-EB01 were confirmed by reanalysis on a second GC column, verifying no target analytes were detected above the PQL of the sample.

K. Quantitation and Identification:

K.1 No target analytes were detected in the project sample.

K.2 The laboratory reported an incorrect PQL (2 ppb) for PCBs in the project sample. The 0.1 ppm calibration standard was the lowest point of the curve, therefore, the PQLs should have been reported as 5 ppb. The PQLs has been adjusted by the validator on the data summary forms submitted by the laboratory.

L. Conclusion:

L.1 Due to the previously mentioned problem above, the PQLs have been raised to 5 ppb for the project sample.

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DATA VALIDATION REPORT

PROGRAM:	POINT BARROW / DEW Line RI/FS (ICF Project No. 41096-412-02)
LABORATORY:	Friedman & Bruya, Inc. (Seattle, WA)
REVIEWER:	Timothy Vonnahme
ANALYSIS:	Polychlorinated Biphenyls (PCBs) by USEPA Method D8080.
MATRIX:	Water
DATE:	March 31, 1994

I. INTRODUCTION:

Friedman & Bruya, Inc. (FBI) (Seattle, WA) received 11 water samples from the Point Barrow site (referenced chain of custody record No. 552) on August 26, 1993. Two samples were requested for polychlorinated biphenyls (PCBs) analysis by the PCB organics extraction method described in Section 8 of the Project Sampling and Analysis Plan. The samples were analyzed for PCBs by USEPA Method 8080 (GC/ECD) on September 3, 1993.

The ICF site identification numbers and corresponding FBI laboratory sample identification numbers are listed below.

ICF Site No.	Lab Sample No.	Matrix
BRW-BKGD-SW01	784	Water
BRW-BKGD-SW02	884	Water

The laboratory reported incorrect Practical Quantitation Limits (PQLs) of 2.0 ppb for the sample when the correct PQL should have been 5.0 ppb, since the low point on the initial calibration curve is 0.1 ppm.

The instrument Number-Sequence Date on the Summary Form for Sample BRW-BKGD-SW01 (784) and BRW-BKGD-SW02 (884) were recorded as ICF6 09-03-93. It is the opinion of the reviewer that the PCB analyses should be reported using ICF5 09-03-93 because this instrument used the same instrument methods for both the standards and samples, whereas ICF6 used two different instrument methods.

The analytical results with qualifications are presented on modified sample data sheets

submitted by the laboratory. Definitions of the data qualifiers are listed in Table 1B. This report was prepared in accordance with the USEPA draft document " National Functional Guidelines for Organic Data Review", December 1990, and the analytical guidelines in USEPA Method 8080, and the Project Sampling and Analysis Plan.

II. VALIDITY & COMMENTS:

A. Technical Holding Times:

A.1 Technical Holding time QC criteria were met for all project sample analyses.

B. Initial Calibration:

B.1 The laboratory performed a five point initial calibration on GC System #5 on August 21, 1993. The range of the initial calibration was from 0.1 ppm to 10 ppm. A percent relative standard deviation (%RSD) of 37.2% was calculated using calibration factors determined from the initial calibration. The %RSD of 37.2 exceeds the recommended method criteria of 20.0%, therefore, the detected results are qualified "J" as estimated and usable for limited purposes.

C. Continuing Calibration:

C.1 All QC criteria for the PCB continuing calibrations were met and the results are considered acceptable.

D. Laboratory Blanks:

D.1 PCBs were not detected in the method blank associated with the samples at a concentration above the practical quantitation limits (PQL), and the results are considered acceptable.

E. Instrument Blanks:

E.1 No target analytes were detected at a concentration above the PQL, and the results are considered acceptable.

F. Field Blanks:

F.1 There were no field blank submitted for analyses with the project sample set.

G. Field Duplicate Analyses:

G.1 No field duplicate analyses were requested for the PCB fraction.

H. Surrogate Recoveries:

H.1 A discrepancy exists between the surrogate recoveries reported by the laboratory and the surrogate recoveries calculated by the reviewer, as listed below.

ICF Site No.	Laboratory Results	Validator Results
BRW-BKGD-SW01	112%	86%
BRW-BKGD-SW02	86%	66%

H.2 The discrepancy is not expected to have an affect on the quality of the data because surrogate QC criteria were met.

I. Matrix Spike/Matrix Spike Duplicate:

I.1 The laboratory did not perform any matrix spike/matrix spike duplicate analyses for the PCB analyses.

J. System Performance:

J.1 No problems with system performance were observed for the project sample analyses.

K. Quantitation and Identification:

K.1 The laboratory reported incorrect PQLs (2 ppb) for PCBs in all project samples. The 0.1 ppm calibration standard was the lowest point of the curve, therefore, the PQLs should have been reported as 5 ppb. The PQLs have been adjusted by the validator on the data summary forms submitted by the laboratory.

L. Conclusion:

L.1 No PCBs were detected in the method blank or project samples. Due to the previously mentioned problems with the detection limits, all PQLs for the method blank and project samples are raised to 5 ppb.

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DATA VALIDATION REPORT

PROGRAM: POINT BARROW / DEW Line RI/FS (ICF Project No. 41096-412-02)
LABORATORY: Friedman & Bruya, Inc. (Seattle, WA)
REVIEWER: Timothy Vonnahme
ANALYSIS: Polychlorinated Biphenyls (PCBs) by USEPA Method 8080.
MATRIX: Soil
DATE: April 7, 1994

I. INTRODUCTION:

Friedman & Bruya, Inc. (FBI) (Seattle, WA) received 16 soil samples from the Point Barrow site on August 27, 1993 (referenced chain of custody record No. 557). Four samples were requested for polychlorinated biphenyls (PCBs) by the PCB organics extraction method described in Section 8 of the Project Sampling and Analysis Plan. The samples were analyzed for PCBs by USEPA Method 8080 (GC/ECD) on August 31 and September 1, 1993.

The ICF site identification numbers and corresponding FBI laboratory sample identification numbers are listed below.

ICF Site No.	Lab Sample No.	Matrix
BRW-SS02-SD01	1146	Soil
BRW-SS02-S01	1148	Soil
BRW-SS02-S02	1150	Soil
BRW-SS02-S03	1152	Soil

The analytical results were reported with an adjustment for moisture content.

The instrument Number-Sequence Date on the Summary Form for Sample BRW-SS02-SD01 (1146) and sample BRW-SS02-S01 (1148) were inadvertently recorded by the laboratory as ICF6 09-03-93 instead of ICF5 08-31-93.

The analytical results with qualifications are presented on modified sample data sheets submitted by the laboratory. Definitions of the data qualifiers are listed in Table 1B. This report was prepared in accordance with the USEPA draft document " National Functional Guidelines for Organic Data Review", December 1990, and the analytical guidelines in USEPA Method 8080, and the Project Sampling and Analysis Plan.

II. VALIDITY & COMMENTS:

A. Technical Holding Times:

A.1 The technical holding time QC criteria were met for all project sample analyses.

B. Initial Calibration:

B.1 The laboratory performed a five point initial calibration on GC Instrument ICF5 on August 21, 1993. All samples were quantitated using a linear regression curve calculated from the initial calibration. The range of the initial calibration was from 0.1 ppm to 10 ppm. A percent relative standard deviation (%RSD) of 37.2% was calculated using calibration factors determined from the initial calibration. The %RSD of 37.2 exceeds the recommended method criteria of 20.0%, therefore, the detected results are qualified "J" as estimated and usable for limited purposes.

C. Continuing Calibration:

C.1 All QC criteria for the continuing calibrations were met and the results are considered acceptable.

D. Laboratory Blanks:

D.1 PCBs were not detected in the method blank associated with the samples at a concentration above the practical quantitation limit (PQL) and the results are considered acceptable.

E. Instrument Blanks:

E.1 No target analytes were detected at a concentration above the PQL and the results are considered acceptable.

F. Field Blanks:

F.1 There was no field blank submitted for analysis with the project sample set.

G. Field Replicate Analyses:

G.1 No field replicate analyses were requested for the PCB fraction.

H. Surrogate Recoveries:

H.1 All surrogate recoveries were calculated referenced against the closest continuing calibration standard.

H.2 All surrogate recoveries met applicable QC criteria, and the results are considered acceptable.

I. Matrix Spike/Matrix Spike Duplicate:

I.1 The laboratory did not perform any matrix spike/matrix spike duplicate analyses for the PCB fraction.

J. System Performance:

J.1 No problems with system performance were observed for the project sample

analyses.

K. Quantitation and Identification:

K.1 Aroclor 1254 was detected in sample BRW-SS02-S02 at a concentration of 14 ppm, which is outside the linear range of the initial calibration (0.1-10 ppm), and the laboratory did not dilute and reanalyze the sample. Therefore, the detected results are qualified "J" as estimated and usable for limited purposes.

K.2 No other problems were observed for compound quantitation and identification.

L. Conclusion:

L.1 Aroclor 1254 was detected in sample BRW-SS02-S02 at a concentration of 3.7 ppm and sample BRW-SS02-S03 at a concentration of 14 ppm.

L.2 Due to the previously mentioned problems with the initial calibration, the detected results in samples BRW-SS02-S02 and BRW-SS02-S03 are qualified "J" as estimated and usable for limited purposes.

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DATA VALIDATION REPORT

PROGRAM: POINT BARROW / DEW Line RI/FS (ICF Project No. 41096-412-02)
LABORATORY: Friedman & Bruya, Inc. (Seattle, WA)
REVIEWER: Timothy Vonnahme
ANALYSIS: Polychlorinated Biphenyls (PCBs) by USEPA Method 8080.
MATRIX: Soil
DATE: April 4, 1994

I. INTRODUCTION:

Friedman & Bruya, Inc. (FBI) (Seattle, WA) received 11 samples from the Point Barrow site on August 27, 1993 (referenced chain of custody record No. 558). Two samples were requested for polychlorinated biphenyls (PCBs) analysis by the PCB organics extraction method described in Section 8 of the Project Sampling and Analysis Plan. The samples were analyzed for PCBs by USEPA Method 8080 (GC/ECD) on September 1, 1993.

The ICF site identification numbers and corresponding FBI laboratory sample identification numbers are listed below.

ICF Site No.	Lab Sample No.	Matrix
BRW-SS02-S04	1204	Soil
BRW-SS02-S05	1206	Soil

The analytical results for the soil samples were reported with an adjustment for moisture content.

The following QC sample designations were included in project documentation: sample numbers BRW-SS02-S04 and BRW-SS02-S05 were designated as field replicates.

The analytical results with qualifications are presented on modified sample data sheets submitted by the laboratory. Definitions of the data qualifiers are listed in Table 1B. This report was prepared in accordance with the USEPA draft document " National Functional Guidelines for Organic Data Review", December 1990, and the analytical guidelines in USEPA Method 8080, and the Project Sampling and Analysis Plan.

II. VALIDITY & COMMENTS:

A. Tech nicalHolding Times:

A.1 Technical Holding time QC criteria were met for all project sample analyses.

B. Initial Calibration:

B.1 The laboratory performed a five point initial calibration on GC Instrument ICF5 on August 21, 1993. All samples were quantitated using a linear regression curve calculated from the initial calibration. The range of the initial calibration was from 0.1 ppm to 10 ppm. A percent relative standard deviation (%RSD) of 37.2% was calculated using calibration factors determined from the initial calibration. The %RSD of 37.2 exceeds the recommended method criteria of 20.0%, therefore, the detected results are qualified "J" as estimated and usable for limited purposes.

C. Continuing Calibration:

C.1 Continuing calibration standard (File 098R0101) reported a percent recovery of 69% exceeding the QC criteria (75-125%). All detected results and practical quantitation limits (PQLs) associated with this continuing calibration are qualified "J" as estimated and usable for limited purposes.

C.2 All other QC criteria for the continuing calibrations were met and the results are considered acceptable.

D. Laboratory Blanks:

D.1 PCBs were not detected in the method blank associated with the samples at a concentration above the practical quantitation limit (PQL) and the results are considered acceptable.

E. Instrument Blanks:

E.1 No target analytes were detected at a concentration above the PQL and the results are considered acceptable.

F. Field Blanks:

F.1 There was no field blank submitted for analysis with the project sample set.

G. Field Replicate Analyses:

G.1 A QC limit for precision of ≤50 percent as measured by Relative Percent Difference (RPD) between soil sample values, was specified for field replicate comparability.

G.2 Samples BRW-SS02-S04 and BRW-SS02-S05 were utilized for field replicate analyses. The results met all applicable QC criteria, and the results are considered acceptable.

H. Surrogate Recoveries:

H.1 A discrepancy exists between the surrogate recoveries reported by the laboratory and the surrogate recoveries calculated by the reviewer, as listed below.

The reviewer calculated the recoveries of the two samples using the average surrogate area from the initial calibration.

ICF Site No.	Laboratory Results	Validator Results
BRW-SS02-S04	200%**	151%**
BRW-SS02-S05	140%	105%

H.2 The surrogate recovery for sample BRW-SS02-S04 was outside the QC criteria, therefore the detected result for that sample is qualified "J" as estimated and usable for limited purposes.

H.3 All other surrogate recoveries met applicable QC criteria, and the results are considered acceptable.

I. Matrix Spike/Matrix Spike Duplicate:

I.1 The laboratory did not perform any matrix spike/matrix spike duplicate analyses for the PCB fraction.

J. System Performance:

J.1 No problems with system performance were observed for the project sample analyses.

K. Quantitation and Identification:

K.1 A discrepancy exists between the detected result reported by the laboratory and the result regenerated by the reviewer for both samples as indicated below. Results are reported in parts per million (ppm).

ICF Site No.	Laboratory Results	Validation Results
BRW-SS02-S04	12.0	11.0
BRW-SS02-S05	9.5	10.4

The discrepancies are probably due to inconsistent quantitation procedures performed by the laboratory. Since the difference in the laboratory and validator results are small, no additional action was taken.

K.2 Both samples displayed concentrations for Aroclor 1254 that just exceeded the 10 ppm initial calibration standard concentration, and the laboratory did not perform a dilution analysis. It is the opinion of the reviewer that since the areas were just outside the QC criteria, it will not affect the quality of the data

K.3 It is the opinion of the reviewer that since the chromatograms displayed probable hydrocarbon interferences in addition to Aroclor 1254, a second GC column confirmation should have been performed.

L. Conclusion:

L.1 Aroclor 1254 was detected in both samples. No PCBs were detected in the method blank.

L.2 Due to the previously mentioned problems with the initial calibration, continuing calibration and the surrogate recoveries, all detected results for all project samples and the method blank PQL are qualified "J" as estimated and usable for limited purposes.

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DATA VALIDATION REPORT

PROGRAM:	POINT BARROW / DEW Line RI/FS (ICF Project No. 41096-412-02)
LABORATORY:	Friedman & Bruya, Inc. (Seattle, WA)
REVIEWER:	Timothy Vonnahme
ANALYSIS:	Polychlorinated Biphenyls (PCBs) by USEPA Method 8080.
MATRIX:	Water
DATE:	April 5, 1994

I. INTRODUCTION:

Friedman & Bruya, Inc. (FBI) (Seattle, WA) received 8 samples from the Point Barrow site on August 26, 1993 (referenced chain of custody record No. 554). Requested analyses were for polychlorinated biphenyls (PCBs) by the PCB organics extraction method described in Section 8 of the Project Sampling and Analysis Plan. The samples were analyzed for PCBs by USEPA Method 8080 (GC/ECD) on August 29 and September 1, 1993.

The ICF site identification numbers and corresponding FBI laboratory sample identification numbers are listed below.

ICF Site No.	Lab Sample No.	Matrix
BRW-AOC2-SW01	843	Water
BRW-AOC2-SW02	844	Water
BRW-AOC2-SW03	845	Water
BRW-AOC2-SW04	846	Water
BRW-AOC2-SW05	847	Water
BRW-AOC2-SW06	848	Water
BRW-AOC2-SW07	849	Water
BRW-AOC2-SW08	850	Water

The following QC sample designations were included in project documentation: sample numbers BRW-AOC2-SW04 and BRW-AOC2-S08 were designated as field duplicates.

It should be noted that all quantitation limits reported by the laboratory (2.0 ppb) for the samples were lower than those specified in the Project Sampling and Analysis Plan (5.0 ppb). The correct practical quantitation limit (PQL) when employing the lowest usable calibration point (0.1 ppm) should be 5.0 ppb.

The analytical results with qualifications are presented on modified sample data sheets submitted by the laboratory. Definitions of the data qualifiers are listed in Table 1B. This report was prepared in accordance with the USEPA draft document " National Functional Guidelines for Organic Data Review", December 1990, and the analytical guidelines in USEPA Method 8080, and the Project Sampling and Analysis Plan.

II. VALIDITY & COMMENTS:

A. Technical Holding Times:

A.1 Technical Holding time QC criteria were met for all project sample analyses.

B. Initial Calibration:

B.1 The laboratory performed a five point initial calibration on GC Instrument ICF5 on August 21, 1993. All samples were quantitated using a linear regression curve calculated from the initial calibration. The range of the initial calibration was from 0.1 ppm to 10 ppm. A percent relative standard deviation (%RSD) of 37.2% was calculated using calibration factors determined from the initial calibration. The %RSD of 37.2 exceeds the recommended method criteria of 20.0%, therefore, the detected results are qualified "J" as estimated and usable for limited purposes.

C. Continuing Calibration:

C.1 All QC criteria for the continuing calibrations were met and the results are considered acceptable.

D. Laboratory Blanks:

D.1 PCBs were not detected in the method blank associated with the samples at a concentration above the practical quantitation limit (PQL) and the results are considered acceptable.

E. Instrument Blanks:

E.1 No target analytes were detected at a concentration above the PQL and the results are considered acceptable.

F. Field Blanks:

F.1 There was no field blank submitted for analysis with the project sample set.

G. Field Duplicate Analyses:

G.1 A QC limit for precision of ≤50 percent as measured by Relative Percent Difference (RPD) between water sample values, was specified for field duplicate comparability.

G.2 Samples BRW-AOC2-SW04 and BRW-AOC2-SW05 were utilized for field

duplicate analyses. The results met all applicable QC criteria, and the results are considered acceptable.

H. Surrogate Recoveries:

H.1 All surrogate recoveries met applicable QC criteria, and the results are considered acceptable.

I. Matrix Spike/Matrix Spike Duplicate:

I.1 The laboratory did not perform any matrix spike/matrix spike duplicate analyses for the PCB fraction.

J. System Performance:

J.1 Sample BRW-AOC2-SW01 was reanalyzed on 9/1/93 due to GC instrument problems. All criteria were met on the reanalysis.

J.2 No other problems with system performance were observed for the project sample analyses.

K. Quantitation and Identification:

K.1 The laboratory reported incorrect PQLs of 2.0 ppb for the samples when the correct PQLs should have been 5.0 ppb, since the low point on the initial calibration curve is 0.1 ppm.

L. Conclusion:

L.1 PCBs were not detected in the method blank or project samples.

L.2 Due to the previously mentioned problems, the PQLs for all samples were raised to 5 ppb.

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DATA VALIDATION REPORT

PROGRAM:	POINT BARROW / DEW Line RI/FS (ICF Project No. 41096-412-02)
LABORATORY:	Friedman & Bruya, Inc. (Seattle WA)
REVIEWER:	Timothy Vonnahme
ANALYSIS:	Polychlorinated Biphenyls (PCBs) by USEPA Method 8080.
MATRIX:	Soil
DATE:	March 23, 1994

I. INTRODUCTION:

Friedman & Bruya, Inc. (FBI) (Seattle, WA) received 13 soil samples from the Point Barrow site (referenced chain of custody record No. 551) on August 27, 1993 for polychlorinated biphenyls (PCBs) analysis by the PCB organics extraction method described in Section 8 of the Project Sampling and Analysis Plan. The samples were analyzed for PCBs by USEPA Method 8080 (GC/ECD) on August 28 and August 29, 1993.

The ICF site identification numbers and corresponding FBI laboratory sample identification numbers are listed below.

ICF Site No.	Lab Sample No.	Matrix
BRW-BKGD-SD01	818	Soil
BRW-BKGD-S01	820	Soil
BRW-BKGD-S02	822	Soil
BRW-BKGD-S03	824	Soil
BRW-BKGD-S04	826	Soil
BRW-AOC2-SD01	828	Soil
BRW-AOC2-SD02	830	Soil
BRW-AOC2-SD03	832	Soil
BRW-AOC2-SD04	834	Soil
BRW-AOC2-SD05	836	Soil
BRW-AOC2-SD06	838	Soil
BRW-AOC2-SD07	840	Soil
BRW-AOC2-SD08	842	Soil

The following QC sample designations were included in project documentation: sample numbers BRW-AOC2-SD07 and BRW-AOC2-SD08 were designated as field replicates.

The analytical results were reported with an adjustment for moisture content.

The analytical results with qualifications are presented on modified sample data sheets submitted by the laboratory. Definitions of the data qualifiers are listed in Table 1B. This report was prepared in accordance with the USEPA draft document " National Functional Guidelines for Organic Data Review", December 1990, and the analtical guidelines in USEPA Method 8080, and the Project Sampling and Analsis Plan.

II. VALIDIT & COMMENTS:

A. Technical Holding Times:

A.1 Technical Holding time QC criteria were met for all project sample analses.

B. Initial Calibration:

B.1 The laboratory performed a five point initial calibration on GC System #6 on August 21, 1994. The range of the initial calibration was from 0.1 ppm to 10 ppm. A percent relative standard deviation (%RSD) of 30.3% was calculated using calibration factors determined from the initial calibration. The %RSD of 30.3 exceeds the recommended method criteria of 20.0%, therefore, the detected results are qualified "J" as estimated and usable for limited purposes.

C. Continuing Calibration:

C.1 The percent recovery of Aroclor 1254 in the 5 ppm continuing calibration standards associated with the samples are listed below:

File Name	Time/Date	%R	Criteria
098R1601	0228/8-28	112%	75-125%
098R0101	0906/8-28	56%*	75-125%
098R0301	1638/8-28	116%	75-125%
098R0901	0539/8-29	119%	75-125%
098R2401	1657/8-29	118%	75-125%

C.2 Continuing calibration standard (098R0101) was outside the acceptable QC criteria due to a faulty injection. The standard analyzed prior to this was used in its place for quantitation.

C.3 All other continuing calibrations met QC criteria and are considered acceptable.

D. Laboratory Blanks:

D.1 The baseline dropped below zero during analyses, as can be seen on the chromatogram by the straight baseline at zero millivolts. In the opinion of the reviewer this will not affect the quality of the data.

D.2 PCBs were not detected in the method blank associated with the samples at a concentration above the practical quantitation limits (PQL), and the results are considered acceptable.

E. Instrument Blanks:

E.1 No target analytes were detected at a concentration above the PQL, and the results are considered acceptable.

F. Field Replicate Analyses:

F.1 A QC limit for precision of ≤50 percent as measured by Relative Percent Difference (RPD) between soil sample values, was specified for field replicate comparability.

F.2 Samples BRW-AOC2-SD0Z and BRW-AOC2-SD08 were utilized for field replicate analyses. The results met all applicable QC criteria, and the results are considered acceptable.

G. Surrogate Recoveries:

G.1 Surrogate spike percent recoveries (%Rs) for project analyses were met for all project samples referenced against the surrogate areas from the closest continuing calibration standard. However, the exact percent recovery reported by the laboratory could not be verified because the laboratory used an average of the surrogate areas from an unknown number of continuing calibration standards to calculate the surrogate recoveries. Calculating the surrogate recoveries using the closest continuing calibration standards yielded recoveries within the QC criteria, but different than what the laboratory had reported. The surrogate recoveries reported by the laboratory and the values reported by the reviewer are listed below.

ICF Sate No.	Laboratory Results	Validation Results
BRW-BKGD-SD01	102%	80%
BRW-BKGD-S01	107%	88%
BRW-BKGD-S02	106%	100%
BRW-BKGD-S03	100%	86%
BRW-BKGD-S04	96%	82%
BRW-AOC2-SD01	107%	88%
BRW-AOC2-SD02	78%	97%
BRW-AOC2-SD03	94%	78%
BRW-AOC2-SD04	98%	77%
BRW-AOC2-SD05	100%	82%
BRW-AOC2-SD06	98%	82%
BRW-AOC2-SD07	93%	76%
BRW-AOC2-SD08	104%	83%

G.2 Since all surrogate recoveries met applicable QC criteria, the results are considered acceptable.

H. Matrix Spike/Matrix Spike Duplicate:

H.1 The sample used for the matrix spike/matrix spike duplicate analyses (LON-SSO1-S10-4) was not sampled from the Point Barrow site. It was selected from the Point Lonely site. It is the opinion of the reviewer that the affect on the data quality is not known.

H.2 The laboratory reported a value of 96% for the MS and 97% for the MSD. All QC criteria for project MS and MSD analyses were met.

I. System Performance:

I.1 The laboratory reported an autosampler malfunction during the injection of continuing calibration standard (98R0101), as indicated by the low areas.

I.2 No problems with system performance were observed for all other project sample analyses.

J. Quantitation and Identification:

J.1 No PCBs were detected in the soil samples. The PQLs for some of the samples were incorrectly adjusted for moisture content.The corrected PQL values are listed below.

ICF Site No.	Laboratory Result	Validation Result
BRW-BKGD-S01	<0.1 ppm	<0.4 ppm
BRW-BKGD-S02	<0.1 ppm	<0.3 ppm
BRW-BKGD-S03	<0.1 ppm	<0.2 ppm
BRW-AOC2-SD03	<0.1 ppm	<0.2 ppm

J.2 All sample results were quantitated using the closest continuing calibration standard.

J.3 Samples BRW-AOC2-SD01, BRW-AOC2-SD02, BRW-AOC2-SD03, BRW-AOC2-SD05, BRW-AOC2-SD07, and BRW-AOC2-SD08, exhibited raised baselines in the retention time window for the PCBs, which in the opinion of the laboratory and reviewer are of biogenic origin. PCBs were not detected in any of these samples.

K. Conclusion:

K.1 Due to the high percent RSDs in the initial calibration, the detected results for all project samples are qualified "J" as estimated and usable for limited purposes.